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POMBAL, Dom SEBASTIAO JOSE DE CARVALHO, Marquis of, the greatest of all Portuguese statesmen, and one of the ablest men of his time, was b. May 13, 1699, at the castle of Soura, near Coimbra. His father, Manuel de Carvalho, was a capt. of cavalry, and belonged to the second grade of nobility. After studying law at Coimbra, and serving a short time in the army, Pombal was banished from Lisbon on account of his youthful turbulence of disposition, and retired to his birthplace, where he devoted himself for a while to study. Subsequently he married a rich widow, Donna Teresa da Noronha Almada, and repaired to court. In 1739 he was appointed envoy extraordinary to the court of London through the influence of his uncle, Paulo Carvalho, a position which he held for six years, after which he was sent to Vienna in a similar capacity. Here Pombal (whose first wife was now dead) espoused, in 1749, Leonora Ernestina, countess Daun, niece of the famous Austrian marshal of that name. This marriage had a most felicitous influence on his future career. When Pombal returned to Portugal, the Portuguese queen, who was an Austrian princess, conceived a great attachment to his wife; and when her son, Joseph I., ascended the throne in 1750, she induced him to appoint Pombal state secretary for foreign affairs. Immediately his splendid administrative genius burst forth like a sudden blaze of sunshine. He found his country almost without an army, without a fleet, without commerce or agriculture, and all power in the hands of unscrupulous Jesuits and grasping nobles. Among his first acts was to reattach to the crown a great number of domains that had been unjustly alienated. Then followed the reorganization of the army, the introduction of fresh colonists into the Portuguese settlements, the establishment of an East Indian company, and another for Brazil, where he introduced the cultivation of coffee, sugar, cotton, rice, indigo, and cocoa. In virtue of a treaty with Spain signed in 1753, Paraguay became an appanage of the Portuguese crown, and it was in this remote region that Pombal first came into collision with the Jesuits—the founders of the Paraguay missions. He got his brother, Francisco-Xavier de Mendonça, appointed capt.gen. of Paraguay, and is said to have given him secret instructions to ruin the Jesuits in his reports to the king. When the great earthquake happened at Lisbon in 1755 Pombal displayed an almost superhuman courage and energy, in consequence of which the king raised him to the rank of count of Œyras, and in the following year appointed him prime minister. He crushed a revolt instigated by the great nobles and the Jesuits, the latter of whom he now removed from the person of the sovereign, deprived of the power of the confessional, and in 1757 confined to their colleges. A conspiracy against the life of the king, which broke out Sept. 3, 1758, but failed, placed his enemies completely in his power. The leaders were punished with appalling severity. The duke of Aveiro and the marquis of Tavora were broken alive on the wheel, the sons and the son-in-law of the former were strangled, and the wife of the marquis was beheaded. The Jesuits were suspected of complicity in the plot, and Pombal accused them to the pope; and when the latter would not allow the minister to proceed against them in the civil courts, he daringly caused some to be executed in prison. Father Malagrida, who had prophesied the death of the king, was delivered over to the inquisition as a heretic, and condemned to be burnt alive; and this *auto da fé* actually took place in 1761! But Pombal was not satisfied. He had made up his mind that the very presence of the Jesuits in Portugal was incompatible with the security of the government and the welfare of the nation, and by a royal decree of Sept. 3, 1759, they were banished from the kingdom as rebels and enemies to the king. When they refused to leave, Pombal had them violently removed by soldiers, carried on board ships, and transported to the states of the church. The pope, Clement XIII., vehemently protested, whereupon Pombal caused the papal nuncio to be shown across the frontier. Shortly after, Clement XIII. died, and was succeeded in the papal see by Clement XIV.—no friend of the Jesuits, in consequence of which the differences between Portugal and the Vatican were soon made up. All this time Pombal was laboring energetically to improve the cultivation of the land and the system of education. In 1770 he was created marquis of Pombal, and from this period to the death of the king in 1777, he was at the very height of his greatness.

The accession of Joseph's daughter, Maria I.—an enemy of the minister—was immediately marked by his downfall. He was deprived of his offices; the conspirators whom he kept in prison were released; many of his institutions were abolished; and he himself was only saved from the scaffold because he held in his possession documentary proofs of the former treason of his now triumphant enemies. Maria ordered him to retire to his castle of Pombal, where he died May 8, 1782. The peasantry always spoke of him as "the great marquis," and history has stamped the rustic verdict with its approval. When he was turned out of office, he left the queen a public purse containing 78,000,000 cruzados, and a well-ordered and flourishing state.

POME (Lat. *pomum*, an apple), a form of fruit of which examples are found in the apple, pear, and other fruits of the *pomaceæ;* and in which the *epicarp* and *mesocarp* (see FRUIT) form a thick fleshy mass; whilst the *endocarp* is scaly, horny, or stony, and divided into separate cells, in which the seeds are inclosed. The fruit is crowned with remains of the calycine segments. Pomes have 1 to 5 cells, or spuriously 10 cells.

POMEGRANATE, *Punica granatum*, a fruit much cultivated in warm countries, and apparently a native of the warmer temperate parts of Asia, perhaps also of the n. of Africa. It has been cultivated in Asia from the most ancient times, and is frequently mentioned in the Old Testament. It has long been naturalized in the s. of Europe. In a wild state the plant is a thorny bush; in cultivation it is a low tree, with twiggy branches, flowers at the extremities of the branches, the calyx red, the petals scarlet. It is generally referred to the natural order *myrtaceæ*. The calyx is leathery, tubular, 5 to 7 cleft; there are 5 to 7 crumpled petals; the fruit is as large as a large orange, with a thick leathery rind of a fine golden yellow, with a rosy tinge on one side, not bursting when ripe; the cells filled with numerous seeds, each of which is surrounded with pulp, and separately inclosed in a thin membrane, so that the pomegranate appears to be formed of a great number of reddish berries packed together and compressed into irregular angular forms. The pulp is sweet, sometimes subacid, and of a pleasant delicate flavor, very cooling, and particularly grateful in warm climates. It is often used for the preparation of cooling drinks. A kind of pomegranate without seeds is cultivated and much prized in India and Persia. Pomegranates have long been imported in small quantities into Britain from Portugal and the n. of Africa; but have never become an article of general demand and commercial importance like oranges. There is an ornamental variety of the pomegranate with double flowers. The rind of the fruit is very astringent, and a decoction is used as a gargle in relaxed sore throat, and as a medicine in diarrhea, dysentery, etc. Deriving its astringency from tannin, it is used to tan leather. The finest morocco leather is said to be tanned with it, and small quantities are imported into Britain from the n. of Africa for the preparation of the finest kinds of leather, under the name of *pomegranate bark.*—The bark of the roots is used as an anthelmintic and is often successfully administered in cases of tape-worm. Its value was known to the ancients, and it has long been in use in India.—The pomegranate tree is occasionally cultivated in hot-houses or green-houses in Britain. It bears the winters of the s. of England in the open air, and is very ornamental, but the fruit is worthless. In some parts of the s. of Europe it is used as a hedge-plant.

POMEL, a boss or ball used as an ornament on the top of pointed roof, turret, etc.

POMERANIA (Ger. *Pommern*), a province of Prussia, bounded n. by the Baltic, e. by w Prussia, s. by Brandenburg, and w. by the Mecklenburg duchies. Area, 11,600 sq. miles. Pop. (at the close of '75) 1,462,310. Pomerania is divided into the three governmental districts of Stettin, Stralsund, and Köslin.

This province, which is one of the lowest and flattest in Germany, and has few hills of even moderate height, is intersected by the Oder (q.v.), which forms numerous lakes and ponds, the largest of which is the Dammer lake. The waters of this lake and of the Oder are then carried into the Stettiner Haff, from which three outlets—those of the Peene, Swine, and Dievenow—lead into the Baltic. Between these three outlets are the two islands of Usedom and Wollin. After the Oder, the chief rivers of Pomerania are the Ihna, Rega, Persante, Wipper, and Stolpe. The shores in some parts are protected by dikes and sand-banks. The soil is generally sandy, and in many districts even stony, although near Pyritz and Stargard, on the Ploen and Maduc lakes, and at some points of the sea-coast, it presents a tolerably fruitful character, yielding good crops of wheat, and affording rich pasture. About half of the whole area is cultivated; about a sixth is uncultivated, or under water; and the remainder is in pastures, heath, and wood. The chief vegetable products, most of which are grown in sufficient quantities to be largely exported, are—rye, wheat, and other grain, flax, hemp, tobacco, and timber. Among the other exports of Pomerania are horses, cattle, sheep, swine, geese of superior quality, feathers, butter, wool, hams, sausages, smoked poultry, etc. The sturgeon and salmon fisheries are very productive, and Pomerania is noted for its admirable lampreys, eels, and cray-fish, which are largely exported in a pickled state. The mineral products, which are inconsiderable, include bog-iron, lime, marl, alum, salt, amber found on the coast near Stolpe, and peat—which latter substance is obtained in enormous quantities, and extensively used for fuel, notwithstanding the abundant supply of wood yielded by the extensive and productive forests.

Linen and woolen fabrics, and leather, rank among the best of the industrial products; but the manufactures of Pomerania are not of much importance. The principal branches of industry are agriculture and the rearing of horses and cattle, while the active transport-trade between the neighboring Prussian states and the Baltic ports constitutes a very important source of wealth to the province. The main seat of Pomeranian trade is at Stettin (q.v.), which ranks as one of the most important commercial cities of Prussia.

Pomerania, like every other part of the Prussian dominions, is well provided with educational institutions, and, besides the university at Greifswald, it has thirteen gymnasia, several normal and training schools, and numerous classical and other schools.

Pomerania formed, in the earliest periods of its history, a part of the ancient kingdom of the Wends or Vandals. From the year 1062 it had its own ducal rulers, and in the beginning of the 12th c. it adopted Christianity in consequence of the preaching of bishop Otto, of Bamberg. Bogislaus XIV., who died in 1637, was the last male representative of the Wendish ducal line; and, on his death, the house of Brandenburg laid claim to the whole of the Pomeranian territories, in conformity with a compact which the latter family asserted to have been made between them and the Wendish dukes; but the country having been occupied by the Swedes during the thirty years' war, Prussia was obliged to content itself with the possession of further Pomerania, or *Hinterpommern*, which was assigned to it at the peace of Westphalia, while Sweden retained the remainder of Pomerania, with the island of Rugen (q.v.). After the death of Charles XII., and the subsequent decline of the Swedish power, Prussia was able to make good her asserted claims on the territory of Pomerania at the peace of Stockholm; and in 1720 Sweden was compelled to cede s. Pomerania and the island of Rugen, retaining only a narrow strip of land between Mecklenburg and the Baltic, which was also incorporated with Prussia in 1815, after having been first transferred by Sweden to Denmark as part indemnification for the separation from the latter kingdom of Norway, and subsequently ceded to Prussia by the Danes in exchange for the duchy of Lauenburg, and on the payment of 2¼ million thalers to the latter, and of 3½ million thalers to the Swedish government.

POMERANUS, or POMMER. See BUGENHAGEN, *ante*.

POMEROY, a city and the co. seat of Meigs co., Ohio; on the Ohio river, 20 m. above Gallipolis, 40 m. s.w. of Marietta: pop. '80, 5,560. Large deposits of salt are found in the vicinity, and the most important industry is its manufacture, for which there are six furnaces. There are also rolling-mills, machine-shops, and flour-mills. Coal is shipped, taken from veins near by.

POMEROY, JOHN NORTON, LL.D., b. New York, 1828; educated at Hamilton college, graduated 1847; studied law, and was admitted to the state bar in 1851. In 1864 he was elected dean of the law faculty of the university of New York, and became professor of law and political science. He remained in this position for four years, and during this time produced his best book, *Introduction to the Constitutional Laws of the United States*, 1868; and *Introduction to Municipal Law*, 1865. The first is used as text-book at West Point, and many colleges and law-schools. In 1869 he returned to Rochester, and has since published *Remedies and Remedial Rights, according to the Reformed American Procedure*, has edited Sedgwick's *Constitutional Law*, and has contributed many articles to the *North American Review*, the *Nation*, and to legal periodicals. He wrote many articles on law for *Johnson's Cyclopædia*.

POMEROY, SETH, 1715–77; b. Mass.; was maj. of the Massachusetts troops that captured Louisburg in 1745; lieut.col. of the regiment commanded by col. Ephraim Williams, and at his death took command and defeated baron Dieskau; was a delegate to the Massachusetts provincial congress in 1774–75; fought at Bunker hill, and soon after appointed senior brigadier by the continental congress; but in consequence of disputes about military rank, he declined the appointment and retired to his farm.

POMIGLIA'NO D'AR'CO, a t. in the province of Naples, Italy, about 8½ m. n.e. of Naples; pop. about 10,000. The vicinity has many times been covered by lava from Vesuvius. There are two very handsome churches, a hospital, and several ancient ruins, among which is one supposed by some antiquarians to be the palace of Pompey alluded to by Cicero.

POMMETTÉE, or POMEL CROSS in heraldry, a cross whose extremities terminate in single knobs or pomels, like the *bourdon* or pilgrim's staff.

POMOLOGY (Lat. *pomum*, a fruit of any kind, an apple), a term much employed in France and Germany, and to a smaller extent in Britain, to designate the study of fruits and of their cultivation, particularly those of the natural order *pomaceæ* (q.v.). See FRUIT, FRUIT-GARDEN, APPLE, PEAR, etc.

POMONA (whose name is obviously connected with *pomum*, "a fruit") was, among the Latins, the patron divinity of garden-produce. The poets, not, perhaps, without some allegorical design, represent several of the rural gods as her lovers—Silvanus, Picus, Vertumnus, etc. Of Vertumnus, in particular, it is related that after he had vainly tried to approach her under a thousand different forms, he at last succeeded by assuming the figure of an old woman. In this guise, he recounted to her the lamentable histories of women who had despised love, and having touched her heart, suddenly transformed himself into a blooming youth and married her. But Vertumnus (connected with *verto*, "to turn," or "to transform") is probably nothing more than a personification of those changes by which plants advance from blossom to fruit. The worship of Pomona, as was natural among a homely race of farmers and shepherds like the ancient Latins, was of considerable importance. Varro tells us that at Rome her services were under the care of a special priest, the *flamen Pomonalis*. In works of art she was generally represented with fruits in her lap, or in a basket, with a garland of fruits in her hair, and a pruning-knife in her right hand.

POMONA, or MAINLAND, much the largest and most populous of the Orkney Islands (q.v.), in which group it occupies a central position. It is open to the Atlantic on the w., and to the German ocean on the e., while on the n. Enhallow and Shapinsha sounds separates it from the islands of Rousay and Shapinsha, and on the s., Scapa Flow separates it from Hoy and South Ronaldsha. Area, 150 sq.m.; pop. '71, 16,541. It is 25 m. in length, and 15 m. in extreme breadth, but is very irregular in shape. At the town of Kirkwall, the breadth of the island is only about 2 miles. In the w., the shores are bold and elevated, but there is a general slope toward the east. The surface is diversified with hill and lake, and consists in great part of moor and heath. Good pastures are found, however, and in the valleys there is a fertile, loamy soil. Oats, beans, and bere are produced, and sheep and swine are extensively reared. The chief towns are Kirkwall (q.v.) and Stromness (q.v.).

POMPADOUR (JEANNE ANTOINETTE *Poisson*), Marquise de, a notable mistress of Louis XV., was b. in Paris in 1720 or 1722. Her reputed father was a certain François Poisson, who held a humble office in the army-commissariat; but M. le Normand de Tournheim, a rich *fermier-général*, claimed for himself the honors of a dubious paternity, and brought up the little Jeanne as his daughter. She turned out a wonderfully clever child, and M. le Normand spared no pains to give her the best, or, at least, the most stylish education possible. She excelled in such accomplishments as music, elocution, and drawing; but what charmed the brilliant society that frequented the *salons* of the rich financier, was the perfect grace and beauty of her figure, and the exquisite art with which she dressed. A crowd of suitors constantly besieged her, but the one who obtained her hand was her cousin, Le Normay l'Etioles. They were married in 1741. But Mme. l'Etioles, who was constantly told by her infamous mother that she was a "morsel for a king," was careless of her husband's honor and peace. Though he loved her to distraction—and he was a man with whose love any woman might have been content—she, cold, heartless, and ambitious, was scheming day and night to attract the notice of the monarch. Her efforts were after a time crowned with success, and Mme. l'Etioles was installed in the palace of Versailles; she was soon afterward ennobled by the title of marquise de Pompadour, and long ruled the king, first as mistress, and afterward as *amie nécessaire*. One reads with some astonishment of the incessant artifices she had recourse to in order to preserve her influence—the everlasting huntings, concerts, private theatricals, little suppers, and what not—anything to distract the royal mind (surely sufficiently distracted already by nature), and to make it think only of the clever purveyor of gayeties! The private theatricals, in particular, were a great success, and were "got up" every winter from 1747 to 1753—the marquise herself proving a charming actress. The king thought the marquise extremely clever, and, when he ceased to "love" her, was glad to avail himself of her services as his political adviser. In fact, she became premier of France; the council of ministers assembled in her boudoir, where the most important affairs of state were settled. The choice of ministers, of ambassadors, of generals, depended on the caprice of a female; the abbé de Bernis, the favorite of a favorite, entered the council. Foreign diplomacy turned the circumstance to account. The Austrian prime-minister induced Maria Theresa to sacrifice her pride to the exigencies of her position, and the empress-queen wrote the courtesan a letter in which she addressed her as *ma cousine*. That word turned the head of the marquise, and changed for a time the foreign policy of France. She died (April 15, 1764) with the reins of government in her hands. During her lifetime, immense sums from the national treasury were paid away to the marquise, and to her brother, created marquis de Marigny. In the years 1762–63 alone, they amounted to 3,456,000 livres. She had numerous houses and lands also given her. In 1853, M. le Roi, keeper of the town-library of Versailles, published in the *Journal de l'Instruction Publique*, a list of the expenses of the marquise de Pompadour during the years in which she had enjoyed the royal favor, which he had found in MS. in the archives of the department of Seine-et-Oise. They amounted to 36,000,000 livres. She was imperious and vindictive beyond measure, and with relentless cruelty doomed to perpetual imprisonment, in the dungeons of the bastille and elsewhere, multitudes who had dared to speak about her ill-gotten gains and power. After facts like these, it is but a poor apology for the marquise to say that she encouraged savans, poets, and philosophers, patronized and protected the *Encyclopédie*, and aided in the expulsion of the Jesuits. The *Lettres* in her name are mostly spurious. See the *Life* by Goncourt (new ed. 1878).

POMPEII, a city of Campania, was built at the mouth of the river Sarnus (*Sarno*), looking out on the bay of Naples. It stood at the base of Mt. Vesuvius, between Herculaneum and Stabiæ. Of its early history little is known (legend ascribed its foundation to Hercules); but in more recent times it became a favorite resort for wealthy Romans, many of whom, including Cicero, had villas in the suburbs. It must have been at one time a place of considerable trade, since it was the port-town of Nola and other inland cities which studded the fertile valley of the Sarnus. The city was much damaged by an earthquake which happened on Feb. 5, 63 A.D., and not many years had revolved when the great and final calamity overtook it. In 79 A.D. occurred that terrific eruption of Vesuvius which, in one day, overwhelmed in irremediable ruin the towns of Pompeii, Herculaneum, and Stabiæ. In course of time a small village rose at or near the spot; but by and by the memory of Pompeii was forgotten, and for centuries its very site was unknown. The difficulty of discovering its true position was increased in consequence of the changes produced by this fearful convulsion, which had hurled back the Sarnus from its ancient course, and raised the sea-beach to a considerable height, so that the re-discovered city, to which merchantmen resorted of old, is now a mile from the coast, and a considerable distance from the stream that in ancient times was wont to skirt its walls. For more than sixteen hundred years Pompeii lay undisturbed beneath heaps of ashes and cinders. At length, in 1689, some ruins were noticed, but it was not till 1755 that any excavations were made. These operations, begun by the Neapolitan government, have been continued till the present time (and recently with increased energy), and have been exceedingly productive of objects which interest the antiquarian and the classical scholar. The remains found are in a remarkably good state of preservation, owing to the fact that the city was destroyed not by lava, but by showers of sand, ashes, and cinders (*lapilli*), forming a light covering, which found its way into every nook, and, as it were, hermetically sealed up the town. It would appear that in some parts at least the matter was desposited in a state of liquid mud, and so flowed into the remotest cellars of the doomed habitations. This is proved by the discovery of the skeleton of a woman "inclosed in a mold of volcanic paste, which retained a perfect impression of her form." It suggested to signor Fiorelli, the director of the excavations, the idea of filling up the molds with liquid plaster, and obtaining casts of the forms they contained. Many interesting objects recently discovered have thus been preserved. Among recent excavations are several paintings of classical subjects, one of which, the Laocoon, excavated in 1875, is a most valuable specimen of ancient art. That the superincumbent rubbish, in most places about 15 ft. deep, is the accumulation of several eruptions is proved by the facts: that as many as eight or nine different layers have been distinctly counted; and that, while the upper layers are undisturbed, the lower one has evidently been moved. The comparatively few skeletons found, and the almost entire absence of objects of great value, as gold and silver plate, show that most of the inhabitants (estimated at 20,000) escaped and returned to bury their dead, and recover their treasures. In the autumn of 1864, upward of two hundred skeletons were found in a temple of Juno, the victims having evidently gone thither to seek the protection of the goddess. Only about one-third of the city has as yet been excavated. The plan of Pompeii seems to have been regular, the narrow streets crossing one another at right angles. The houses were plain and seldom more than two stories high, and had all their good apartments on the ground-floor. The walls are about two miles in circumference. It would be impossible in our brief space to attempt even an enumeration of the objects discovered in this now famous city. Suffice it to say that in all the departments of social life—in the affairs of domestic and of public life, of the worship of the gods, and the shows of the arena—in architecture, painting, and sculpture—in fine, in all the appliances of comfort and of luxury in a wealthy community, we have, as it were, a living picture of a city 1800 years ago. The reader who wishes fuller information should consult Mazois's work, *Les Ruines de Pompeii* (Paris, 1812–38); Breton's *Pompeia* (Paris, 1855); Overbeck's *Pompeji in seinen Gebäuden, Alterthümern und Kunstwerken* (3d ed., Leip. 1875); sir W. Gell's well-known *Pompeiana* (4 vols. 1824–30); and *Pompeii: its History, Buildings, and Antiquities*, by T. H. Dyer (1875). For a popular account of the state of Pompeii some years ago, we may refer to *Something of Italy*, by W. Chambers (1862).

POMPELMOOSE, or POMELO, *Citrus pompelmoos*, a fruit nearly resembling the shaddock (q.v.), of which, perhaps, it ought to be esteemed a variety, although it is now distinguished by some botanists as a separate species. It is large and pale yellow. It has long been cultivated in the East Indies, and has recently been introduced into many warm countries. It has become an article of importation into Britain, and is frequently to be seen in fruit-shops. In pleasantness of taste it resembles the best oranges. It is often preserved with wine and sugar, when it is very agreeable and refreshing in a hot climate. The rind is often candied.

POMPEY THE GREAT. Cneius Pompeius Magnus, son of Cneius Pompeius Strabo, was born in 106 B.C. At the early age of 17 he began to learn the military art under his father by service in the field against the Italians in the Social war. Though so young, he gave proof of extraordinary valor and of remarkable energy of character. On the death of his father in 87 B.C., when he was only 19 years of age, he was left without a protector, and during the temporary triumph of the Marian party, he was for some time in considerable danger. When Sulla, to whose side he was attached, returned from Greece to Italy to oppose Marius, Pompey hastened into Picenum, where he had considerable estates and influence, and there raised an army of three legions, with which he successfully opposed the forces of the Marian party, compelling them to quit the district, and effecting a junction with Sulla. During the rest of the war he behaved with great prudence and valor, and with such remarkable success, that, on the restoration of peace in Italy, the conduct of the war against the remains of the Marian faction in Africa and Sicily was intrusted to him. He speedily performed his commission, and on his return to Rome was honored with the name of MAGNUS (i.e., "the great"), and with a triumph, which, for one who had not yet held any public office, and was merely an *eques*, was an unprecedented distinction. His next exploits were the reduction of the followers of Lepidus, whom he drove out of Italy, and the extinction of the Marian party in Spain, led on by the brave Sertorius. This latter work was one of no small difficulty. Pompey suffered some severe defeats at the hands of Sertorius, and it was only after Sertorius had been assassinated that he was able to put an end to the war. In returning to Italy after an absence of five or six years in Spain, he fell in with and defeated the remnants of the army of Spartacus, and thus claimed the credit of concluding the Servile war. He was now the idol of the people, and though legally ineligible to the consulship, was elected to that important office for the year 70, the senate relieving him of his disabilities rather than provoke him to extremities. Hitherto Pompey had belonged to the aristocratic party; but, as he had of late years been looked upon with suspicion by some of the leading men, he publicly espoused the people's cause. He carried a law restoring the tribunician power to the people, and aided largely in introducing the bill of Aurelius Cotta (*lex Aurelia*), that the *judices* should for the future be taken from the *senate*, the *equites*, and the *tribuni aerarii*, instead of from the senate alone. In 67–66 B.C. Pompey performed a noble service to the republic in clearing the Mediterranean of the pirates who infested it in immense numbers; and during the next four years, 65–62, he conquered Mithridates, king of Pontus, Tigranes, king of Armenia, and Antiochus, king of Syria. At the same time he subdued the Jewish nation, and captured Jerusalem. On his return to Italy he disbanded his army, and entered Rome in triumph for the third time in 61 B.C. And now his star began to dim. Henceforward we find him distrusted by the aristocracy, and second to Cæsar in popular favor. After his return he was anxious that his acts in Asia should be ratified by the senate, and certain lands apportioned among his veteran soldiers. But the senate declined to accede to his wish, and he therefore formed a close intimacy with Cæsar, who promised to secure for him the accomplishment of his objects, if he in turn would assist Cæsar in the attainment of *his* aims. Crassus, who possessed enormous wealth, and who in consequence exercised a wide influence at Rome, was induced to forego his grudge to Pompey, and thus these three men formed among themselves that coalition which is commonly called "the first triumvirate," and which for a time frustrated all the efforts of the aristocratic party. This small oligarchy carried all before them; Pompey's acts in Asia were ratified; Cæsar's designs were all gained; his agrarian law, distributing land in Campania among the poorer citizens was passed, and thus, too, Pompey's promises to his troops were fulfilled. Cæsar's daughter, Julia, was given in marriage to Pompey, and private relationship was thus made to bind tighter the tie of political interest. And now, for some years following, Cæsar was reaping laurels in Gaul, and rising higher in popular esteem as a warrior and statesman, while Pompey was idly wasting his time and his energies at Rome. But Pompey could not bear a rival. Jealousies sprang up; Julia died in 54 B.C., and thus father-in-law and son-in-law were sundered by a yet wider gulf, which no bridge could span. Pompey now returned to his former friends, the aristocracy, whose great desire was to check Cæsar's views, and strip him of his command. Cæsar was ordered to lay down his office and return to Rome, which he consented to do, provided Pompey, who had an army near Rome, would do the same. The senate insisted on an unconditional resignation, and ordered him to disband his army by a certain day, otherwise he would be declared a public enemy. To this resolution two of the tribunes in vain objected; they therefore left the city and cast themselves on Cæsar for protection. It was on this memorable occasion that he crossed the Rubicon, and thus defied the senate and its armies, which were under Pompey's command. The events of the civil war which followed have been recorded in the life of Cæsar (q.v.). It remains only to mention, that after being finally defeated at Pharsalia in 48 B.C., Pompey escaped to Egypt, where, according to the order of the king's ministers, he was treacherously murdered by a former centurion of his own, as he was landing from the boat. His head was cut off, and afterward presented to Cæsar on his arrival in Egypt. But Cæsar was too magnanimous to delight in such a sight. The murderer of Pompey was, by his orders, put to death. The body lay on the beach for some time, but was at length buried by a freedman, Philippus, who had accompanied his master to the shore.

POMPEY, SEXTUS, B.C. 75–35; second son of Pompey the great, and called Pompey the younger; celebrated in Roman history for his resistance to Antony and Octavius. Hearing of the death of his father he fled, finally escaping to the borders of the Lacetani, and rallying in the mountain fastnesses a gang of banditti. He applied to the Roman senate for the restitution of his father's property which had been confiscated. He received a large sum of money from the public treasury, and the title of commander of the seas. Marching southward he crushed all opposition, took possession of Bœtica, and assumed the state and authority of a sovereign. When he learned, B.C. 43, that a second triumvirate was formed, and that he was among the proscribed, he resorted to piracy, his mariners boarded traffickers, and Corsica, Sardinia, and Sicily fell into his power. Rome was reduced to the point of starvation by his interception of their corn-ships; the people compelled Antony and Octavius to negotiate a peace. A treaty was concluded advantageous to Sextus. Sicily, Sardinia, Corsica, and Achaia were given him, and he was promised the consulship the following year. But hostilities were soon resumed, and in 36 a Roman squadron under Agrippa destroyed his fleet off Naulochus. Pompey fled, but after a few months was overtaken by Titus, carried to Miletus, and put to death.

POMPEY'S PILLAR. The name of a celebrated column standing in the neighborhood of Alexandria. It stands upon an eminence about 1800 ft. s. of the walls. It is a monolith of red granite, and of the Corinthian order, and stands upon a pedestal. Its total height is 98 ft. 9 in.; shaft, 73 ft.; 29 ft. 8 in. in circumference. The shaft is well executed. On the summit is a circular depression for the base of a statue, which in some old drawings is represented standing on it. The name popularly applied to it of Pompey's pillar is an erroneous appellation given by ancient travelers, who confess they do not know whence it was derived, and still retained. The inscription on the base, however, shows that it was erected by Publius, prefect of Egypt, in honor of the emperor Diocletian, who is styled upon it "the invincible;" and it is supposed to record the conquest of Alexandria by Diocletian, 296 A.D., and the suppression of the rebellion of the pretender Achilleus. It appears to have been in the vicinity of a circus, forum, or gymnasium. The obelisk stood upon some fragments of Egyptian monuments of remote antiquity, consisting of a piece with the name of a monarch of the 13th Egyptian dynasty, and another with that of Psammitichus I., the former of which is now in the British museum.—Wilkinson's *Modern Egypt*, i. p. 149 and foll.; White, *Ægyptiaca*, p. 1, and foll.; Champollion-Figeac, *L'Egypte*, p. 472; Norden, i. p. 22.

POMPONIUS MELA. See MELA, *ante.*

PONANI, or PANIANI, a seaport t. of British India, in the district of Malabar, on the s. side of an estuary of a river of the same name, about 600 m. s.e. from Bombay. The river is navigable only for canoes to the distance of 63 m. from the sea. The population is employed in fishing and in trade, having numerous patemars, or sea-going boats. Ponani was formerly a much more considerable place, until nearly ruined by the oppression of Tippoo sultan. Under the system of railways by which the Madras territories are traversed, the eastern and western coasts of this part of the peninsula have been united by a line from Ponani to Madras. Pop. '72, 11,472.

PONCAS, a tribe of Dakota Indians, originally a part of the Omahas. They formerly lived on the Red River of the North, but were constantly attacked by the Sioux, who drove them from place to place, until greatly reduced in numbers, when they left the region of the Missouri and settled on the Ponca river, where they built a fortified village. In Mar., 1858, they sold their land to the government, a valuable tract lying between Iowa creek and White river. They removed to a reservation near the Yanktons; here they were again attacked by the Sioux, which disturbance, accompanied by the failures of their crops, caused them to become dissatisfied, and a new treaty was made in Mar., 1865, which gave them 756,000 acres of land near the mouth of the Niobrara river, from which they were afterward transferred to the Indian territory, where a majority now (1881) remain, though allowed to return to Dakota if they prefer.

PONCE DE LEON, FRAY LUIS, a celebrated Spanish poet, was b. in 1527, probably at Granada. In 1544 he entered the order of St. Augustine, at Salamanca, where he studied, took his degree in theology in 1560, and was appointed professor of the same in 1561. The reputation that he acquired as a learned commentator on the Bible induced some persons, who were envious of his success, to accuse him of having disregarded the prohibition of the church, inasmuch as, at the request of a friend, he made a new translation of the Song of Solomon, and brought out prominently, in his arrangement of the verses, the true character of the original—viz., that of a pastoral eclogue. This interpretation was not that adopted by the Catholic church, and Ponce de Leon was summoned, in 1572, before the formidable tribunal of the inquisition at Valladolid to answer the charges of Lutheranism, and of translating the sacred writings contrary to the decrees of the council of Trent. The first accusation he quickly disposed of—for he had in reality no inclination to a foreign Protestantism; but the second was undoubtedly true, and Ponce de Leon was imprisoned. After five years he was released through the intervention of powerful friends, and was even reinstated in his chair at the university with the greatest marks of respect. The numerous auditory that assembled to witness the resumption of his lectures were electrified when Ponce de Leon began with these simple words, "As we observed in our last discourse"—thus sublimely ignoring the cause and the duration of his long absence from his lecture-room. In 1580 Ponce de Leon published a Latin commentary on the Song of Solomon, in which he explained the poem directly, symbolically, and mystically; and, therefore, as obscurely, says Mr. Ticknor, "as the most orthodox could wish." Ponce de Leon lived 14 years after his restoration to liberty, but his terror of the inquisition never quite left him, and he was very cautious in regard to what he gave to the world during his lifetime. He died in 1591. Ponce de Leon's poetical reputation was wholly posthumous, for though his *De los Nombros de Christo* (On the Names of Christ) (Salamanca, 1583–85), and *La Perfecta Casada* (The Perfect Wife) (Salamanca, 1583), are full of imagery, eloquence, and enthusiasm, yet they are in prose. His poetical remains were first published by Quevedo at Madrid in 1631, under the title, *Obras Proprias, y Traduciones Latinas, Griegas, y Italianas: con la Paraphrasi de Algunos Salmos y Capitulos de Job*, and have since been often reprinted. These consist of translations from Virgil's *Eclogues* and the *Georgics;* from the *Odes* of Horace, and other classical authors, and from the Psalms. His original poems are few, but they are considered among the most precious in the author's language, and have given Ponce de Leon a foremost place among the Spanish lyrists. According to Ticknor, "Luis de Léon had the soul of a Hebrew, and his enthusiasm was almost always kindled by the reading of the Old Testament. Nevertheless, he preserved unaltered the national character. His best compositions are odes composed in the old Castilian versification, with a classic purity and a vigorous finish that Spanish poetry had never till then known, and to which it has with difficulty attained since." See Nicholas Antonio, *Bibliotheca Hispana Nova;* Ticknor, *History of Spanish Literature;* and Villemain, *Essais sur la Poésie Lyrique.*

PONCE DE LEON, Juan, 1460–1521; b. Spain; belonged to an ancient family, and was a page to Ferdinand V., and also served in the wars against the Moors of Granada. He sailed with Columbus on his second voyage to Hispaniola in 1493, and became commander of the eastern province. In 1508 he sailed on an expedition to Porto Rico, and a year later, having conquered the island, became governor of it, and ruled with great rigor until his removal, which was effected through the influence of the family of Columbus. In 1512, advanced in years, but with his love of adventure still unquenched, he sailed from Porto Rico in search of the mythical fountain of youth, which was supposed to exist in the Bahamas, whither Ponce de Leon sailed, and having failed in finding it, set sail for Florida, where he arrived on Easter Sunday. The banks were covered with beautiful foliage intermingled with flowers, and he took possession of the peninsula in the name of his sovereign, and called it Florida. He still continued his search for the famous fountain along the coast, and also on the Tortugas, and finally returned to Porto Rico, leaving another to continue the search. He returned to Spain in 1513, and received the appointment of governor of Florida, and in 1521 undertook to colonize it, but being wounded by one of the natives, returned to Cuba, where he died.

PONCHO, an important article of male attire in Chili. It consists of a piece of woolen cloth, 5–7 ft. long, 3–4 ft. broad, having in the middle a slit through which the wearer passes his head, so that the poncho rests upon the shoulders, and hangs down before and behind. In the fashions of recent times, the poncho has been introduced in Europe.

POND, Enoch, D.D., b. Mass., 1791; graduated at Brown university, 1813; studied theology with Dr. Emmons; was ordained in 1814, and settled as pastor of the Congregational church at Auburn, Mass., where he remained until 1828, when he became conductor of the *Spirit of the Pilgrims*, a monthly religious magazine in Boston. In 1832 he was elected professor of theology in the seminary at Bangor, Me.; in 1856 became president of the institution, professor of ecclesiastical history, and lecturer on pastoral duties. He has published reviews of *Judson on Baptism; Monthly Concert Lectures; Memoirs of President Davies; Memoir of Susanna Anthony; Memoir of Count Zinzendorf; Memoir of John Wickliffe; Morning of the Reformation; No Fellowship with Romanism; The Young Pastor's Guide; The Mather Family; The World's Salvation; Pope and Pagan, or Middleton's Celebrated Letters; Swedenborgianism Reviewed; Plato: his Life, Works, Opinions, and Influence; Review of Bushnell's God in Christ; The Ancient Church; Memoir of John Knox; Lectures on Christian Theology; Lectures on Pastoral Theology; Sermons;* and numerous articles in the *Bibliotheca Sacra*, *Biblical Repository*, and many other periodicals.

POND, John, studied at the Maidstone grammar-school, and at Trinity college, Cambridge. Having, on account of ill-health, spent several years abroad, he settled on his return at Westbury, near Bristol, where he remained till 1807. While here he made observations proving that the quadrant then at Greenwich for the determination of declinations had changed its form since the time of Bradley in 1750, a result which Troughton verified by actual measurement. In 1807 he returned to London, and in 1811 succeeded Dr. N. Maskelyne as astronomer royal. He is the inventor of the method of observing in groups, and was the first astronomer who advocated what is now the universal practice of depending on masses of observations for all fundamental data. In 1833 he completed a standard catalogue of 1113 fixed stars. His works are the volumes of the Greenwich observatory, published during his astronomership; various papers in the *Transactions* of the royal and royal astronomical societies; translation of the *Système du Monde* of Laplace. He received a pension in 1835.

PONDICHERRY, the chief of the French settlements in India, situated in the district of South Arcot, in the Madras presidency. The other French establishments are Mahé in Malabar, Karikal (q.v.) in Tanjore, Yanaon in Godavari, and Chandernagore (q.v.) in

Bengal. The extent of the united territories is given by M. Block at 188 sq.miles. Pondicherry is situated on the Coromandel coast in 11° 56′ of n. lat., and 79° 54′ of e. long., and is 88 m. from Madras. The territory of Pondicherry is divided into three districts—Pondicherry, Vellenore, and Bahour—has an area of 107 sq.m., and comprises 92 villages. The total population of the French establishments in India in 1840 was reckoned at 171,217; in 1876 it amounted to 285,022. The population of the town of Pondicherry is about 50,000. Its exports (indigo, cotton, skins, nuts, oils, etc.) and imports amount in value to about £600,000 annually. Pop. of district of Pondicherry about 90,000. The town stands on a sandy plain, and is divided by a canal into a European and a native town. It has a handsome square, where are the governor-general's house, the Catholic cathedral, and the bazaar. In Pondicherry is the high court for the French possessions in Asia, a European college, and an Indian school. The open roadstead is defended by a citadel, and possesses a light-house; and from it mail steamers sail for Europe, Madras, etc. The governor of Pondicherry is governor-general of the French possessions in India. The spinning of cotton and the fabrication of cotton-thread are the chief manufactures in French establishments.

History.—The first settlement of the French in India was at Surat, in 1668. The chief of the French East India company at that time was Carou. Subsequently he took Trincomalee from the Dutch; but theywere not long in repossessing themselves of it. Carou then turned to the Coromandel coast. In 1672 he took from the Dutch St. Themé, a Portuguese town (now a suburb of Madras); but two years later the Dutch retook this place also. It was then that François Martin collected about 60 Frenchmen and settled them in Pondicherry, which, in 1674, he had purchased, with the surrounding territory, from Giugee, who had the supervision of all Sivaje's conquests in the country. The Dutch took the town in 1693; but by the treaty of Ryswick it was restored to the French in 1697. Chandernagore was ceded to the French in 1688 by Aurungzebe. In 1727 they obtained the cession of Mahé; in 1739 they purchased Karikal from the king of Tanjore; and in 1752 Yanaon was ceded to them. Dupleix was governor of Pondicherry when war broke out between France and England,and in 1746 La Bourdonnais took Madras. In 1748 admiral Boscawen besieged Pondicherry, but two months later, was compelled to raise the siege. In the same year occurred the peace of Aix la Chapelle; but it did not put an end to hostilities in India till some time later. In 1757 war recommenced. In 1758 count de Lally became governor-general, and attacked the English settlement of fort St. David, which surrendered, and was totally destroyed. In 1761 Eyre Coote took Pondicherry. By the peace of Paris Pondicherry was restored to the French in 1763 with reduced territory, and also Mahé, Karikal, and Chandernagore. Pondicherry was again taken by the English under sir Hector Monro in 1778, and restored in 1783. In 1793 the English again repossessed themselves of it, but the treaty of Amiens in 1802 again restored it, but only till the following year. From this time it was held by the English till, by the treaties of 1814 and 1815, it was for the last time restored to France, reduced to the narrow limits assigned by the treaty of 1783.

Annexed is a statement exhibiting some particulars relative to such of the present French possessions in India subordinate to Pondicherry as are not noticed separately in this work:

YANAON, in the Godavari district, in 16° 43′ n. lat., and 83° 11′ 16″ e. long., about 24 m. s. of Rajahmundry. The area is about 13 sq.miles.

MAHÉ in the Malabar district, in 11° 42′ n. lat., and 75° 36′ 16″ e. long. The area is only about 2¼ sq.miles.

POND LILY. See WATER LILY (*ante*).

PONDWEED, *Potamogēton*, a genus of plants of the natural order *naiades*, having hermaphrodite flowers, sessile upon a spike or spadix, which issues from a sheathing bract or spathe, a perianth of four scales, four sessile anthers opposite to the scales of the perianth, four pistils, which become four small nuts, and a curved embryo. The species abound chiefly in the rivers, lakes, and ditches of Britain and continental Europe, but they are found also in other parts of the world, and some of them in New Holland. They often present a beautiful appearance in clear streams and ponds, where they protect the spawn of fish and harbor aquatic insects, their seeds also affording food to aquatic birds. The roots are a favorite food of swans. Some of the species have the leaves all submersed, others have some of their leaves floating, and considerably different in form from the submersed leaves.

PONGO, *Simia* or *Pithecus Wormbii*, an ape of the same genus with the orang (q.v.), but of much larger size, 6 ft. or more from the heel to the crown of the head, and covered with black hair, with which dark red hair is mingled. It is a native of Borneo, Sumatra, and probably of other neighboring islands, inhabiting the deepest recesses of the forests, and much more rarely seen by man than its congener the orang, which was at one time supposed by the most eminent naturalists to be the same species in a younger state. It is sometimes called the black orang. It has a very prominent muzzle, a large mouth, the face nearly naked, except the lower part, which has a beard. Little is yet known of the habits of the pongo. It is believed to feed chiefly on fruits. It possesses great strength, and, like the orang, is evidently adapted by its conformation for moving chiefly among the boughs of trees.

PONIATOWSKI, a celebrated princely family of Poland, is of Italian origin, being directly descended from the family of the Torelli, whose ancestors were counts of Guastalla. One of the Torelli family having settled in Poland, assumed the name of Poniatowski from his wife's estate of Poniatow in that country. Those of the Poniatowski family who make a figure in history are **PRINCE STANISLAS PONIATOWSKI**, who, in the war of succession to the kingdom of Poland, joined Charles XII. of Sweden in supporting Stanislas Leszczynski; his sons, Stanislas-Augustus, the last king of Poland (q.v.), and **ANDREW**, who rose to great distinction in the Austrian service; and Andrew's son, **JOSEPH-ANTONY, PRINCE PONIATOWSKI**, the celebrated Polish chief in the army of Napoleon. Joseph-Antony was born at Warsaw, May 7, 1762, and at the age of 16 entered the Austrian army, with which he made the Turkish campaign of 1787, and rose to the rank of col. of dragoons. In 1789 he returned to Poland, and was named commander-in-chief of the army of the south, having under him Kosciusko, Wielhorski, Lubomirski, and other celebrated leaders. His army, though much inferior in numbers to that of Russia, which, in 1792, invaded the country, gained the brilliant victories of Polonné and Zielencé; but Poniatowski's uncle, king Stanislas, by agreeing to the convention of Targowitz (q.v.), put an end to the contest in 1798. The prince then resigned his command, and went into voluntary exile; but returned in the following year to aid Kosciusko, now dictator, in his fruitless opposition to the third partition of Poland. On the proposal of Napoleon to reconstitute the kingdom of Poland, Poniatowski joined the French (1800) at the head of a Polish army, and did good service against the Russians at the battles of Golymin, Dantzic, and Friedland; but the French emperor, by the treaty of Tilsit, handed over Poland to its enemies, and only the duchy of Warsaw (nominally subject to the king of Saxony) was left intact. Poniatowski was appointed generalissimo and commander-in-chief for the duchy; and so zealously did he labor for the development of its military resources, that, in 1809, when the war between France and Austria was resumed, he was able to drive the Austrians out of the Polish territory, and overrun a considerable part of Galicia. He continued to administer the military affairs of the duchy till 1812, when he joined the French army, destined to invade Russia, with a Polish army of 100,000 men. But, to his intense disgust, the greater part of his army was broken up into detachments, which were incorporated with the various French legions, and Poniatowski was left with not more than 10,000 men under his direct command. At the head of this division, which always composed the extreme right of the French army, Poniatowski gathered innumerable laurels on the battle-field, and at the storming of the Russian fortresses; but he was so severely injured at Smolensko during the retreat that he was obliged to return to Warsaw (Dec., 1812). In the following autumn he resumed his old place in the French army, and on Oct. 16, received from the emperor the dignity of marshal of France, an honor, in his own estimation, much inferior to that of "generalissimo of the Poles," which he already possessed. After the defeat at Leipsic (q.v.), Poniatowski was left with the remnant of his Polish division to protect the French retreat, which he accomplished by keeping the Prussians in check for several hours; at last, when his force was reduced to 300 men with 30 horses, and himself severely wounded, he retreated over the Pleisse, swimming his horse through the river; but, in attempting similarly to cross the Elster, exhausted nature could no longer bear up, and he sank to rise no more, Oct. 19, 1813. His body was recovered six days after, and was embalmed and carried to Warsaw, whence it was afterward removed to Cracow, and placed beside the ashes of Sobieski and Kosciusko.

PONSARD, FRANCIS, 1814–67. A French dramatist b. in Vienna; educated for the bar, with tastes for poetical literature. In 1837 he translated Byron's *Manfred* into French, but it found few readers. While residing several years in Vienna he contributed to the *Revue de Vienne*. His first approved production was *Lucrèce*, which was hawked through Paris to find a reader among the literary judges for the stage in 1843, and finally in 1853 got a hearing through the friendship of Charles Renaud. Theatrical rivalries aided to secure it a brilliant reception, and it has since maintained its place among the best productions for the French stage. In 1846 he produced *Agnes de Méranie*, which was coldly received; in 1850 *Charlotte Corday*, which was popular; and followed that by a comedy entitled *Horace et Lydie*, which was completely successful. In 1853 his *L'Honneur et l'Argent* was brought out at the Odéon and had an unexampled run of popularity. It was remarked as forming an era in Parisian taste that a piece so pure and high in its tone should have a reception so continuously warm—it having run more than 100 consecutive nights without losing interest with the public. The poetic talent displayed in it is not of a high order; but in grace of diction, sustained interest, and intense sympathy created with the moral of the play, it is remarkable. In 1856 he produced the comedy of *La Bourse*, an excellent satire on the rage for speculation then just reaching fever heat in Paris; in 1866 the *Lion Amoroux;* and in 1867, shortly before his death, *Galilée*. Ponsard was made a member of the academy in 1855 soon after the pronounced success of *L'Honneur et l'Argent*.

PONT-À-MOUSSON, a t. of France, department of Meurthe-et-Moselle, on the railway from Nancy to Metz, 20 m. n.n.w. of the former of these towns. The Moselle flows through the town, which is situated in a fruitful valley. There is a fine Gothic church dedicated to St. Martin. Pont-à-Mousson has large cavalry barracks, and some manufactures of pottery. Pop. '76, 9,904. It was the birthplace of marshal Duroc, the favorite and friend of Napoleon.

PONTASSIE'VE, a t. of Italy, province of Florence, in a picturesque situation, at the junction of the Sieve with the Arno, 12¼ m. e. of the city of Florence; is a walled town with well-kept streets, a handsomely decorated square, and a large church. The inhabitants are engaged chiefly in agricultural pursuits, and at its fairs all the rich products of Tuscany are profusely displayed.

PONTCHARTRAIN, LAKE; in Louisiana, about 5 m. n. of New Orleans, with which it communicates by a canal, is 40 m. long, and 24 m. in extreme width. It is navigated by small steamers, and communicates on the e. with the gulf of Mexico, and on the s. with the Mississippi. Its greatest depth is from 16 to 20 feet.

PONTECOR'VO, a city of southern Italy in the province of Caserta, situated on the river Garigliano, 37 m. n.w. of Capua, with 10,020 inhabitants, almost all engaged in agriculture. It has an old castle, many churches, and is a bishopric. It formerly belonged to the pope; but now, since 1860, it forms part of the kingdom of Italy, and is a sub-prefecture. Napoleon I. gave the title of prince of Pontecorvo to marshal Bernadotte, afterward king of Sweden.

PONTE DA. See BASSANO, *ante*.

PONTE DELGA'DA, a t. on the s. coast of the island of St. Michael, one of the Azores (q.v.), in lat. 37° 40' n., and long. 25° 36' west. It is defended by the castle of St. Braz, which can mount 90 pieces of cannon, and by the forts of Sao Pedro and Rosto de Cao. The anchorage in the roadstead is bad and the harbor is shallow, but still the trade (which is largely in the hands of English merchants) is the most considerable of all the towns in the Azores. The chief exports are wheat, maize, and oranges. Pop. estimated differently from 16,000 to 22,000.

PONTEDE'RA, a t. in the province of Pisa, Italy, near the junction of the Arno and Era rivers, 13 m. n.e. of the city of Pisa; pop. about 11,000. In the middle ages its possession was the subject of fierce contention between Florence and Pisa, and it was then a walled and strongly fortified place. It is now an important manufacturing place, and the weaving of woolen and cotton cloth is the chief industry.

PONTEFRACT (commonly pronounced *Pomfret*), a market t. and municipal and parliamentary borough, in the county of York, and 24 m. s.s.w. of the city of that name, on the Lancashire and Yorkshire railway. There are two churches, viz., St. Giles and All-Saints; the latter is in the early English style, and has a handsome tower. There are a grammar, as well as national and other schools, several alms-houses, a large workhouse built in 1864, a splendid market hall opened by lord Palmerston in 1860, etc. In the vicinity are extensive gardens and nurseries. Eight fairs for the sale of cattle take place annually. The trade is chiefly in corn, licorice, and malt. Two members are returned to the house of commons for the borough. Pop. '71 of municipal borough, 5,350; of parliamentary borough, 11,653.

The castle of Pontefract, built shortly after the conquest, was a large and strong edifice, and stood on a commanding height. It was the scene of the imprisonment and death of Richard II., and here also Rivers, Grey, and Vaughan were put to death, at the instigation of Richard III. The remains of the castle to be seen at the present day are very meager.

PONTEFRACT CAKES are small lozenges of refined licorice, which have for centuries been made at Pontefract, and are much esteemed. They are impressed with a rude figure of a castle, intended to represent Pontefract castle.

PONTEVE'DRA, a t. of Spain, in Galicia, is situated on a peninsular slope near the mouth of the river Lerez, 35 m. s. of Santiago. Pontevedra is a clean and pretty place, with high old walls, granite-built houses, broad streets, and pleasant arcades. It takes its name from the bridge (*Pons Vetus*) that spans the river. The Pontevedrans are engaged chiefly in agriculture, though sea-fishing is also carried on, and there are some manufactures. Pop. 4,800. The neighborhood, of which charming views are obtained from parts of the town, is covered with villas, farms, and woodlands.

PONTIAC, the co. seat of Oakland co., Michigan, 26 m. n.w. of Detroit, on the Clinton river, and the Detroit and Milwaukee railroad; pop. '70, 4,867. It has churches, schools, 3 banks, and 3 newspapers. Among the public buildings are a court-house, the high school, a state reform school, and an insane asylum, erected in 1877 at a cost of almost $500,000. It has a large export trade in wool, wheat, and flour. There are planing mills, foundries, flour mills, etc.

PONTIAC, a co. in n.w. Quebec, Canada, on the Ottawa river; about 20,000 sq.m.; pop. '71, 16,457. The surface is diversified and heavily wooded. Large quantities of lumber are made. Co. seat, Bryson.

PONTIAC, 1720-69; b. near the Ottawa river, chief of the Ottawas, an Algonquin tribe of Indians. He was an early ally of the French, and in 1764 defended Detroit against the attacks of other Indian tribes, and it is thought he assisted in the defeat of

Braddock in 1755. In 1762, incensed at the English for having gained a victory over the French, and perhaps foreseeing the extermination of his people, he determined on their overthrow, and formed a conspiracy to murder them or drive them from the country w. of the Alleghanies, and invited the various tribes to join him. The conspiracy was well planned, and so quietly arranged that no suspicion of it arose until the first blow had been struck, June, 1763; within two weeks all the English garrisons and trading posts w. of Oswego, excepting Niagara, fort Pitt, and Detroit, fell into his hands. He then with his followers besieged Detroit for nearly a year, but, col. Bradstreet receiving re-enforcements, the Indians were forced into submission, and the chiefs of the hostile tribes sued for pardon and peace; Pontiac alone remained unconquered, and retired to the country of the Illinois. During the siege of Detroit, in order to buy supplies for his followers, Pontiac issued bills of credit written on birch-bark, with a picture of an otter for signature; these notes were taken by the French, and afterward redeemed by Pontiac. Once more he endeavored to arouse the Indians to rebellion, and sought the assistance of the French as well as of Indian tribes, but failed, and in 1766, his power being gone, he submitted to English rule. He was murdered in 1769 in Cahokia, a village on the Mississippi, near St. Louis, by an Indian who had been bribed to do the deed by an English trader.

PONTIANAK, the capital of the kingdom of the same name on the w. coast of Borneo, is situated near the junction of the Landak and Kapuas. It is built on both banks of the river, which is 900 ft. broad, and thence to the sea is called the Pontianak. The city derives its importance from being the seat of the Netherlands' resident, who rules directly and indirectly over the whole w. coast, from 2° 56′ s. to 2° 50′ n. lat., and 108° 45′ to 112° 50′ e. long.; territories rich in vegetable and mineral wealth. The residency house is near fort Du Bus, in 0° 2′ n. lat., and 109° 1′ 30″ e. long.; other principal buildings being the sultan's palace, the mosque, and hospital. Pop. 7,000, including 2,000 Chinese. Trade is the only pursuit in the town; and the rich alluvial lands are partly cultivated with rice, sugar-canes, cotton, indigo, coffee, provisions, and fruits.

Besides a number of small dependencies, the Netherlands' resident at Pontianak governs the important kingdoms of Landak, Mampawa, and Sambas, with the mining district of Montrado, in the n.; Tayang, Simpang, and Matan or Succadana, to the s.; and Sangouw, Sekadouw, and Singtang, in the interior. The produce consists of diamonds, gold, coal, tin, iron, wax, edible nests, pepper, gutta-percha, etc. There are many gold mines in Montrado and other districts; rich iron ores in Matan; gold, platina, copper, etc., in Sambas; and in former times Landak was rich in diamonds, but the produce is now trifling. In this district was found the famed diamond of the sultan of Matan, which weighed 367 carats. The annual produce of the mines in the residency of Pontianak is estimated at not less than 425,000 ounces of gold. In 1873, pop. 365,881, of whom 142 were Europeans, 24,997 Chinese, 90,128 native Malays, 248,798 Dyaks, etc.

In 1872 the Dutch imports and exports were: imports, £182,212, and exports, £178,833. Vessels above 10 tons burden, belonging to the w. division of Borneo, 62, amounting to 1680 tons. The other Netherlands possessions in Borneo are called the residency of the s. and e. division, including the lands from Matan, in the s.w., along the s. and e. coasts to 0° 50′ n. lat. The resident's house is at Banjermassin, on the island of Tatas, 15 m. from the mouth of the Banjar, in 3° 34′ 40″ s. lat., and 114° 30′ e. long. Pop. 30,000. The exports are—pepper, diamonds, gold-dust, coal, benzoin, wax, rattans, dragon's blood, camphor, edible nests, iron, fire-arms, etc. Imports—piece-goods, powder, knives, opium, rice, salt, sugar, Chinese porcelain, silk-stuffs, coral, pearls, etc. In 1874 the coal-mines of Orange-Nassau produced 3,637¼ tons. On the e. coast there is also coal, and the sultan of Kûtei delivers it, according to contract, for the use of the Dutch navy, at £1 per ton. During 1872, the imports of the s. and e. residency amounted to £229,025, and the exports to £120,461. The vessels above 10 tons belonging to it numbered 30, with a tonnage of 2,543 tons. At Nagara (pop. 10,000), in Banjermassin, are important factories of fire-arms and other weapons.

There has been constant war on the s. and e. coasts since 1859. In 1860, the direct government of Banjermassin was assumed by the resident; but the interior of the kingdom has always been disturbed, and especially in 1873, through the war with Atcheen (q.v.), inciting the Mohammedan population against the Dutch. In 1873 pop. of the s. and e. division, 869,763, of whom 403 were Europeans, and 2,643 Chinese.—See *Borneo's Westerafdeeling, Geographisch, Statisch, Historisch* (P. J. Veth, Amsterdam); the latest colonial reports by the Netherlands secretary of state for the colonies, etc.

PONTIFEX (of doubtful derivation) was the title borne by the members of one of the two great colleges among the ancient Romans, instituted for the purpose of preserving and cultivating religious knowledge; the other was the college of augurs. See AUGURIES and AUSPICES. It is customary to speak of the college of pontiffs as a "priesthood;" it was not, however, strictly speaking, such—that is to say, the members were not charged with the worship of any particular divinity, nor did they conduct sacrifices. Their duties embraced the regulation of all the religious rites and ceremonies (both public and private) of a state—e.g., how the gods should be worshiped, how burials should be conducted, how the souls of the dead (manes) should be appeased. To them was intrusted the care of the calendar, the proclamation of festival days, etc. They also saw that every religious and every judicial act took place on the right day. "As they had thus," says Dr. Mommsen, "an especial supervision of all religious observances, it was to them in case of need (as on occasion of marriage, testament, or *arrogatio*) that the preliminary question was addressed, whether the matter proposed did not, in any respect, offend against divine law." In matters of religion they were the supreme authorities: from their decisions there was no appeal, and they themselves were responsible neither to the senate nor the people; further, they had power to inflict punishment on such priests as dared to disobey their injunctions, and deviate into schismatical courses. The words of Festus are, *Rerum quæ ad sacra et religiones pertinent,* JUDICES ET VINDICES. Their president was termed *pontifex maximus.*

The pontiffs, according to Roman tradition, were instituted by Numa—a mythical person, to whom the origin of nearly all the religious institutions of Rome is ascribed. But as they appear in all the Latin communities, they are regarded by Mommsen as a "thoroughly national Italian institution," and probably found a place in the earliest religious organization of the Latin race. Their number was originally four, or, including the *pontifex maximus,* five, all of whom were taken from the patricians. In 300 B.C., the Ogulnian law raised the number to nine, four of whom were to be plebeians. The first plebeian, however, who attained the dignity of *pontifex maximus* was Tib. Coruncanius, 254 B.C. Sulla, in 81 B.C., again increased the number to 15, and Julius Cæsar to 16. During the empire, the functions of *pontifex maximus* were generally discharged by the emperors themselves; and the name survived even the establishment of Christianity, occurring in inscriptions of Valentinian, Valens, and Gratianus; but at length the emperors dropped it, when it was picked up by the Christian bishops of Rome; and now this title, borrowed from a pagan cult, forms one of the sacred designations of his holiness the pope.

PONTIFICAL (Lat. *pontificale,* belonging to a pontiff or bishop), one of the service-books of the church of Rome, in which are contained the several services, whether in the administration of sacraments, or the performance of public worship, in which the bishop exclusively, or at least a priest delegated by the bishop, officiates. There were many such collections for the various national churches; but that which is now in universal use throughout the western church is the *Pontificale Romanum,* or Roman Pontifical, as published by authority of Clement VIII. in 1596, and repeatedly republished since that time. The Pontifical contains the services for ordinations, for religious professions and receptions of monks and nuns, consecrations, benedictions, etc., as well as of the solemn administration by a bishop of those sacraments which are ordinarily administered by priests. Besides the prayers to be recited, the Pontifical also lays down the ceremonial to be observed. The rules of this ceremonial are of two kinds—*preceptive,* the literal observance of which is obligatory; and *directive,* which admit of a certain interpretation.—Another of the service-books of bishops is called the "Ceremoniale;" but it is chiefly confined to a description of the peculiar ceremonial with which bishops are required to celebrate solemnly those offices, as of the mass, vespers, the funeral office, etc., which are common to them with priests. The most prized editions of both these service-books are those published by authority of the learned pope, Benedict XIV.

PONTIFICAL STATES. See PAPAL STATES, *ante.*

PONTIGNY, a village in France 18 m. n.e. of Auxerre; pop. 770; noted for its tile and brick, and for having an extensive ancient abbey, visited Sept. 3, 1874, by the English Roman Catholic bishop of Westminster at the head of 800 English pilgrims to visit the shrine of Edmund, patron saint of Westminster. The abbey was frequently the asylum of the bishops of Canterbury when at variance with English kings; Thomas à Becket found refuge there in 1164, since which time it has furnished asylum for a great number of royal heads.

PONTINE MARSHES (Lat. *Pomptinæ Paludes*), a low-lying district, forming the southern part of the Campagna di Roma, and extending in a south-easterly direction from Cisterna to the sea at Terracina. Its greatest length is about 30 m., and its breadth from 4 to 11 miles. It does not reach the sea-coast on the w., being separated from it by a broad sandy tract covered with forest; but even this barrier partakes to some extent of the character of the marshes themselves, being quite as flat, and largely intermixed with swamp and lagoon. The Pontine Marshes have undoubtedly been formed by the stagnation of the streams that take their rise in the Volscian hills, and by the accumulation of sand along the shore from Astura to the Circeian promontory, but this formation as undoubtedly belongs to pre-historic ages. There is no reason to believe that the Pontine marshes were, in ancient times, essentially different from what they are at present. Pliny, it is true, on the authority of a contemporary, Mucianus, states that at one period they had contained 24 or even 33 cities; but no confirmation of this statement is to be found in any earlier writer, and not a single name of these cities has been preserved. The first attempt to drain the Pontine marshes in ancient times was made in 160 B.C. by the consul, Cornelius Cethegus; but his efforts were only partially successful, for toward the close of the republic, the region had become as marshy as ever. Julius Cæsar, among his vast schemes for the improvement of the commonwealth, projected one for the drainage of this pestilential district, but his murder prevented its complete realization. Augustus also appears to have done something; but in the time of Juvenal, it was a mere haunt of robbers. Theodoric, the Goth, likewise tried to reclaim it; but the desolations of succeeding reigns soon reduced it to a hopeless condition, and it continued an uninhabitable region until the close of the middle ages. The first in modern times to resume the labors of the ancients was pope Boniface VIII., who drained the district about Sezzo and Sermonetta by means of a large canal. In 1417, Martin V. made another canal, called the *rio Martino*, which was dug to within a mile of the sea; but after his death the project was given up. Several additional efforts were subsequently made; but nothing was really accomplished till the time of pope Pius VI., who, in 1778, commenced to drain the marshes, and completed the drainage in 10 years. The reclamation of the land, however, has been found possible only in part. Though much is under cultivation and in pasturage, a great portion is hopelessly irreclaimable; and the whole region is so unhealthy, that, in the summer months, the inhabitants are obliged to remove to the neighboring mountains.—The famous Appian way (q.v.) went through the Pontine marshes; and after being unused for centuries, was re-opened by Pius VI.

PONTOISE, a small city in France; 20 m. n.w. from Paris, on the line of the Northern railway, at the confluence of the Oise and the Viosne; pop. 6,480. It has a considerable commerce in grain, and manufactures mill machinery, leather, and matches. It was a village antedating the Roman conquest, destroyed by the Normans in the 9th c., and down to 1758 had an eventful history.

PONTOON (through the French *ponton*, from the Latin *pons*, a bridge) the name given to buoyant vessels used in military operations for supporting a temporary bridge. Pontoon bridges have been constructed, with greater or less skill, from the earliest times. Darius passed the Hellespont and Danube by pontoon bridges, and the former was traversed by Xerxes's immense army on similar temporary bridges, very admirably formed. A pontoon train is a necessity for every army maneuvering in a country where there are rivers, and many campaigns have proved failures from the want of this cumbrous but indispensable apparatus. In most armies the pontoons are under the charge of the engineers; but in the Austrian army there is a distinct and highly-trained corps, called *pontonieren*. Marlborough used clumsy wooden pontoons. Napoleon and Wellington had them lighter of tin and copper. They were flat-bottomed, rectangular boats, open at the top. Anchored at stem and stern, beams were laid over from one to another, and transoms with planks crossing these beams completed the roadway of the bridge. These open pontoons were exposed to the disadvantage that they were very liable to be filled with water, and thus ceased to support the bridge. They were, moreover, very heavy, one pontoon, with appurtenances, constituting a wagon-load. As 36 were deemed necessary for the train, a pontoon equipment was a serious item in the *impedimenta* of an army. The open pontoons are now, however, obsolete, modern science having substituted closed cylindrical vessels of copper (or occasionally of India-rubber), which are far lighter, can in an emergency be rolled along, and can only be submerged if perforated. Against the last contingency, they are divided within into water-tight compartments, so that one perforation may not seriously detract from the total buoyancy of a pontoon. In the British service two pontoons are used: the larger, with hemispherical ends, being 22 ft. 3 in. in length, and 2 ft. 8 in. in diameter; the smaller, cigar-shaped, with conical ends, 15 ft. in length, 1 ft. 8 in. in diameter. Two of the largest used to form a raft weigh 8 cwt. 7 lbs.; the superstructure, 18½ cwt. At 24 ft. apart from center to center, this raft will carry infantry four deep, marching at ease; cavalry, two deep, and light field-guns; at 16 ft. interval, heavy guns. A raft of three pontoons, at close distances, will support siege-ordnance. The pontoons can be used in very wide rivers as rafts, in their proper sense, or they can be connected, when the width permits, to form a bridge. In the latter case each is towed into line, anchored above as it drops to its place, and a second time when its exact spot is reached. It is computed that each pontoon requires 1½ minutes to take its position, and that when the pontoons are placed, the roadway can be laid, if properly arranged previously, in 1½ minutes for each interval between two pontoons. A river of 600 ft. may thus be bridged in less than 1½ hours. The process of throwing a bridge over in face of an enemy is fraught with the utmost danger to the engineers employed. Pontoon bridges have to be passed with great care, and every measure should be adopted, as breaking step, etc., which can reduce the peculiarly dangerous vibration.

PONTOP'PIDAN, ERIK, 1698–1764; b. Aarhuus; studied theology at the university of Copenhagen, giving also special attention to geography and history. After graduation he became traveling tutor to several young noblemen; was made a chaplain to the king 1735; professor of theology at Copenhagen 1738; and bishop of Bergen, Norway, 1747. Among his numerous writings were *A History of the Geography, Natural History, and Antiquities of Denmark;* a similar history of Norway, which has been translated into English; and *Annals of the Danish Church.*

PONTOTOC, a co. in n. Mississippi, watered by the Tallahatchee and Loosacoona rivers; about 450 sq.m.; pop. '80, 13,858—4,250 colored. The surface is rolling and heavily wooded. The soil is fertile. The principal productions are corn, cotton, and live stock. Co. seat, Pontotoc.

PONTREM'OLI, a t. in the province of Massa-Carrara, Italy; on the s. slope of the Apennines; 23 m. n.w. of Carrara, near the junction of the Verde with the Magra river; pop. about 12,500. It is divided into an old and new town; the former was strongly fortified and guarded by a castle on a neighboring hill. There is a cathedral in the modern part of the city. The citizens are mostly engaged in manufacturing silk, linen, and woolen cloth. In 1834 the inhabitants were driven from the town by a severe earthquake.

PONTUS, the name given by the ancient Greeks to a country in the n.e. of Asia Minor, bordering on the Pontus Euxinus (whence its name), and extending from the river Halys in the west to the frontiers of Colchis and Armenia in the east. Its southern limits were the ranges of Anti-Taurus and Paryadres, so that it corresponded pretty nearly to the modern pashaliks of Trebizond and Siwas. On the e. and s. Pontus is mountainous, but along the coast there are large and fertile plains, which in ancient times produced, and indeed still produce, abundance of grain, fruits, and timber. Game, according to Strabo, was also plentiful. The rearing of bees was carefully attended to, and honey and wax were among the chief articles of commerce. Iron was the principal mineral.

Regarding the ancient inhabitants of Pontus nothing is known ethnologically. Greek colonies, indeed, flourished on the coast from the 7th c. B.C., and doubtless spread some knowledge of civilization among the inland barbarians; but how far the latter were influenced thereby we cannot tell. They first appear as divided into numerous tribes, virtually independent, but owning a nominal allegiance to the Persian kings, whose authority was represented by a hereditary satrap belonging to the royal family of Persia. It was one of these satraps, Ariobarzanes, who, by subjugating some of the Pontian tribes, in the year 363 B.C., during the reign of Artaxerxes II., laid the foundations of an independent sovereignty. Ariobarzanes was succeeded in 337 B.C. by Mithridates II., who took advantage of the civil confusions that followed the death of Alexander the great to enlarge his dominions; but the greatest of these Pontine sultans, and one of the most formidable enemies that Rome ever encountered in the east, was Mithridates VI. (q.v.). On the overthrow of this potentate by Pompey (65 B.C.) the western part of Pontus was annexed to Bithynia, and the rest parceled out among the neighboring princes. Subsequently a grandson of Mithridates, Polemon, was installed monarch of the central part of Pontus; but in the reign of Nero it was voluntarily ceded to the Roman emperor, became a Roman province, and was called *Pontus Polemoniacus*. In the reign of Constantine it underwent a new division. The principal towns of ancient Pontus were Amisus, Polemonium, Pharnacia, Cerasus, Trapezus, Apsarus, Cabira, and Neocæsareia.

PONTUS EUXINUS. See BLACK SEA, *ante*.

PONTYPOOL, a small market t. of Monmouthshire, 20 m. w.s.w. of Monmouth, and 10 m. n. of Newport, with both of which it is connected by railway. Japan wares were long made here, but this branch of manufacture has declined. Articles in polished iron are made, and the iron forges and coal and iron mines which surround the town employ many of the inhabitants. Pop. '71, 4,834.

PONY, the common name of many small active breeds of horse (q.v.), belonging to different countries, from India and Africa to Iceland; but in the warmer parts of the world chiefly found in mountainous or sterile regions. They are in general the property of man, and not truly wild, although, in very many cases, they live almost in a wild state, and receive no care or attention except when they are wanted for use. They are in general very hardy, and their strength is great in proportion to their size. They are often vicious, or at least playfully tricky to a much greater degree than is usual with large horses. Ponies are very often covered with rough hair, and have large shaggy manes and forelocks. The *Shetland pony* is a very good example of these small races of horse. The *Iceland pony* is scarcely different from it, and is hardy enough to endure the winter of Iceland without shelter. The *Galloway*, *Welsh*, *Dartmoor*, *Exmoor*, and *New Forest* breeds are British races of pony larger than the Shetland. The progress of inclosure and cultivation in their native regions has so changed the circumstances in which they long subsisted, and in which, perhaps, they originated, that scarcely any of them is now to be seen of pure and unmixed race. Sardinia and Corsica have small races of pony which have subsisted unchanged from ancient times. In the Morea there is a race of ponies, driven in herds to Attica for sale, exceedingly wild and vicious, but capable of being rendered very serviceable. But it is unnecessary to mention the many races both of Europe and Asia. They differ considerably in size, some, like the Shetland pony, suggesting a comparison with a large dog, some much larger. They also differ much in color; a dun or tan color, with a black stripe along the back, is prevalent in many of them. Ponies are seldom employed in agricultural labors; but they are of inestimable value in many wild and mountainous regions, from their hardiness and surefootedness; and are often used as saddle-horses, the largest kinds being even employed as horses for light cavalry.

POO'DLE (*Germ. Pudel*), a kind of dog, originally German, but extensively diffused throughout Europe during the wars of the French revolution, and abundantly introduced into Britain by the soldiers who served in Spain and the Netherlands. It is very closely allied, however, to the coarser crisp-haired *water-dog*, long well known in England, and particularly to water-fowl shooters, and the fishermen of the north-eastern coasts. The *barbet* of the French is a diminutive variety, much in request as a lady's pet. The poodle is of a stout form, and has a short muzzle standing out abruptly from the face; the ears are of moderate length, and pendent; the tail rather short; it is everywhere covered with long curled hair, which in many of the little barbets hangs to the very ground. No kind of dog exhibits greater intelligence or greater affection; and as to both, many interesting stories are on record.

POOLE (so called from the inlet or *pool* on which it stands) is the chief sea-port of Dorsetshire, and is situated on a wide but shallow inlet in the e. coast of the county. It is built of red brick, is intricate and confused in plan, but is pierced by the High street, a m. in length. Along the shore are capacious quays, well lined with shipping. The town is more noted for its trade than for its architecture. Sail-cloth and cordage are manufactured, and together with potters' and pipe clay, provisions, and articles of clothing, form the principal articles of export. Ship and especially yacht building is carried on. The harbor, into which fall the rivers Trent and Frome, is a beautiful estuary, and is a fine feature in the charming scenery of the vicinity. Its depth of water is 13 to 14 ft., and its navigable channels, being unobstructed by rocks or sands, are perfectly safe at all times. Brownsea island, in the middle of the pool, is 6 m. in circumference. On its extreme point stands the castle of the same name. In '75, 657 vessels, of 58,055 tons, entered, and 814, of 61,586 tons cleared the port. Pop. '71, 10,079, who return one member to parliament.

POOLE, JOHN, 1786–1872; b. England; author of many dramatic pieces, novels, essays, and character sketches, some of which were republished in the United States. His farces were acted in the London theaters by Mundon, Liston, Keeley, Cooper, and other distinguished comedians; and many of them are still popular. In his old age he received, chiefly through the influence of Charles Dickens, a small pension from the civil list; but having outlived all his contemporaries, he died neglected and almost forgotten.

POOLE, MATTHEW, a learned English divine of the Puritan age, was born at York about the year 1624, and educated at Emmanuel college, Cambridge. Very little is known regarding his life. In 1662 he figures as preacher in the church of St. Michael le Querne, in London; but was one of the 2,000 ministers whom the act of uniformity compelled to leave the church of England. Subsequently he retired to Holland, and died at Amsterdam in 1679. His principal work, *Synopsis Criticorum Biblicorum* (5 vols. fol. 1669–76, is an attempt to bring together in a condensed form the opinion of 150 biblical critics of all times and countries previous to his own. It is a work showing great (professional) learning, and very respectable talent; but later criticism and research have done much to render it obsolete. Other productions of Poole's are *Annotations on Scripture*, and *The Nullity of the Roman Faith.*

POOLE, WILLIAM FREDERICK, b. Mass., 1821; graduated at Yale college in 1849. He was librarian of the Boston mercantile library 1852–56, then became librarian of the Athenæum library, in the same city. Here he remained thirteen years, becoming well known as one of the leading librarians of the country—a class then including Cogswell, Jewett, Spofford, and Moore. He was for a time in charge of the Cincinnati mercantile library, but left it to accept the librarianship of the Chicago public library, where he now is. In 1848 he published his *Index to Subjects in Reviews and Periodicals;* afterward enlarged to the *Index to Periodical Literature,* 1853; and now announced for republication, extended to date. He also wrote *The Battle of the Dictionaries,* 1856; *Websterian Orthography,* 1857; *The Orthographical Hobgoblin,* 1859; *The Mather Papers,* 1868; and *Cotton Mather and Salem Witchcraft,* 1869.

POO'NA, or PUNA, the capital of a district of British India, of the same name, in the presidency of Bombay, is situated on the small river Moota, near its confluence with the Moola, in a treeless plain about 74 m. s.e. of Bombay. Its present pop. is estimated (1872) at 90,436; but in its palmy days, when it was the capital of the Mahratta power, it contained more than twice that number. A large proportion of the population consists of Brahmans. The city is divided into seven quarters, named after the days of the week, and the principal building is a palatial structure, formerly the residence of the peishwah. Its climate is salubrious and pleasant, and it is the headquarters of the Bombay army. The cantonment for the infantry and horse-artillery is from one to two m. w. of the city. The cantonment for the cavalry is at the village of Kirkee, about two m. to the north-east of the city. In 1821, soon after Poona came into the possession of the British, a college was established for the study of Sanskrit literature, in the hope that the disaffected Brahmans (who had been all-powerful under the peishwah) might be thus conciliated. As the modes of instruction originally adopted were entirely native, and far from efficient, the college has gradually been transformed. At present it possesses a staff of European professors with native assistants, and is a highly respectable seminary for the study of English, Marathi, and Sanskrit. Only Brahmans were admissible into the college as first established; now it is open to the public generally. Poona is very much resorted to, particularly in the rainy season (from June till October), on account of its pleasant and salubrious climate. The fall of rain averages from 22 to 25 inches annually; whereas at Bombay it is about four times as great. The range of the Ghauts (properly called the Sahyadree range) which rises up as a precipitous barrier 2,000 ft. high, with peaks considerably higher, receives the full burst of the monsoon; so that Khandalla on the top of the Ghauts is drenched with almost perpetual rain for four months. Then the clouds pass on, relieved of their watery burden, and the rainfall eastward of the Ghauts is much less. From the Ghauts, the whole country gradually slopes toward the bay of Bengal. Poona is about 1800 ft. above the sea level. One of the most interesting objects in the neighborhood of Poona is a large *bund*, or embankment, solidly built of hewn stone over the Mootamoola river for the purpose of providing a supply of water for the cantonment, and especially the bazaar or native town connected with it. It was built by the late sir Jamsetjee Jeejeebhoy, whose charities were very great. Two forts celebrated in Maratha history are close to Poona—Singhur, about 12 m. to the south-east, and Poorundur, about 18 m. to the south. These are favorite sanatoria during the hot season (from the end of February to June). At Poorunder there is a sanatorium of considerable size for sick soldiers. Poona was formerly a great mart for jewelry and precious stones, but the trade in these things has quite ceased. The native manufactures have also been supplanted by the introduction of European piece-goods, and the only business that prospers is that of dealers in grain and other agricultural produce. The railway has rendered Poona almost a suburb of Bombay. The works by which the railway climbs up the great mountain-barrier of the Ghauts from the lowlands of the Konkan to the high table-land of the Deccan are among the boldest that have as yet been undertaken. The line up the Ghauts was opened in April, 1863.

Of late years great alterations have taken place around Poona. The native city has not greatly altered, except that the streets have been widened and cleaned; but the cantonment has changed rapidly. The great fire of 1879 has left its mark on Poona. Among the most striking of the many new buildings recently reared is the government college—a Gothic building, recently finished, which was erected mainly at the expense of sir Jamsetjee Jeejeebhoy. While speaking of education in Poona, it is but fair to the Scottish mission to say that it commenced English education in Poona soon after the mission was established (in 1831), and has all along carried it on. The schools of the mission, both male and female, both for English and the vernacular (Marathi), are largely attended, even by the highest castes. The female pupils are upward of 300 in number; and one school consists of Mussulman girls. The Mussulmans in India generally are far behind both Hindus and Parsees in their desire to educate the females; in fact, a Mussulman female school is as yet exceedingly rare.

POONA-WOOD is the timber of the poon trees of India (*calophyllum inophyllum* and *C. angustifolium*). It is very commonly used in the East Indies, particularly in ship-building, for planks and spars; these latter are usually called *poon*, and are in general use for masts in that country. The trees are natives of Penang, and of the countries eastward of the bay of Bengal.

POOP, in large vessels, is a sort of supplemental deck raised over the after part of the upper deck. The best cabins are situated beneath it. In old ships a second and even a third poop were raised above the hinder part of the poop proper, giving the vessels that immense height at the stern which is shown in old drawings. The poop is gradually disappearing from ships built either for speed or war, as offering undue resistance to the wind in one case, and an undesirable mark to an enemy in the other.

POOR, DANIEL, D.D., 1789–1850; b. Mass.; graduated at Dartmouth college, 1811; Andover theological seminary, 1814. With the rev. Messrs. Richards, Meigs, and Warren, and their wives, he embarked at Newburyport, Oct. 23, 1815, with the purpose of establishing a Christian mission in Ceylon. They reached Colombo, March 23, 1816, and proceeded thence to the cluster of islands lying off the northern extremity of the main island, where they began their work. Dr. Poor had great earnestness, and had the mental quickness and keenness needed in discussing religious truth with the natives. For several years he had charge of the mission seminary for native young men at Batticotta. In the course of his instructions in the school he demonstrated so clearly the superiority of our astronomical calculations over those of the Hindu astronomers, especially in the accuracy with which we predict eclipses, as to make a great impression on the minds of the heathen, who had thought themselves well advanced in the science. In March, 1836, committing the seminary to other hands, he passed to the continent, and established himself in Madura, a stronghold of heathenism, which has since become a center of mission work and of Christian institutions in southern India. In 1848 he visited his native land, and in many places presented the claims of the heathen with fervor. He returned in 1850 to Jaffna, where he died of cholera.

POOR, ENOCH, 1736–80; b. Mass.; a merchant in Exeter, N. H.; brig.gen. in the continental army in 1777; distinguished in the battles against Burgoyne, and at Monmouth, and in 1780 commanded one of Lafayette's light-infantry brigades. He was killed in a duel with a French officer.

POOR, John Alfred, 1808–71; b. Maine; practiced law in Portland and Bangor, but afterward devoted himself to the developing of railroad interests in that state. He originated the European and North American railroad, and was president of the proposed Portland, Rutland, and Oswego railroad, which was designed, by consolidating numerous existing New England roads and building where necessary, to establish a through line to Chicago, 1000 m. in length. This design was never carried out, the existing Portland and Ogdensburg being the nearest approach to that result. Mr. Poor was a member of the legislature of Maine, and for some years editor of a newspaper, *The State of Maine*. He was an industrious investigator into local history; delivered the address at the Popham celebration in 1868; and wrote, in 1862, *A Vindication of the Claims of Sir F. Gorges*, etc.

POOR, The. Charity, like Christianity, had its origin, or earliest development, in the east. Among the primitive nations of the world alms-giving was inculcated as a religious observance, and is prescribed as such in their sacred records. Among the European nations of antiquity, we find a provision for the poor adopted as a matter of state policy. In early times Athens could boast of having no citizen in want, "nor did any disgrace the nation by begging." But war, at length, brought poverty in its train, and the Athenian people decreed the maintenance of those who were mutilated in battle; and, at a later period, of the children of those who fell. Plutarch mentions Peisistratus as the originator of the first decree, though others derive it from Solon. By the latter decree the state provided for the orphans of its soldiers, up to their eighteenth year, and then sent them into the world with a new suit of armor. The bounty given to the disabled is mentioned by Lysias, Harpocratian, Aristotle, Isocrates, and others; and is variously stated at one, two, and three oboli a day, and it seems to have been increased with the increased cost of subsistence. There were also societies for the relief of distress among the democratic states of Greece, called eranos—a sort of friendly society, in which the members relieved were expected to pay back the money advanced to them when they had raised themselves to better circumstances. But it must be remembered that these so-called democratic states were in reality slave-holding aristocracies.

Among the Romans, the Agrarian and Licinian laws (years of Rome 268 and 388) were framed in order to prevent the extremes of riches and poverty in the state. They limited the extent of property in public land to be held by each citizen, and the latter directed that all such land, above the allotted portion, should be taken away from the holders and given to those who had none. The distribution of grain at reduced prices, which at length became gratuitous, was introduced by Caius Gracchus, and lasted till the fall of the Roman empire. Augustus in vain tried to suppress it. In his time 200,000 citizens were thus fed. Cicero makes mention of this provision as in great favor with the Roman people, because it furnished them with an abundant subsistence without labor; other Roman writers describe its results as disastrous both to agriculture and manners, creating a nation of mendicants, and causing the land to fall out of cultivation.

In the middle ages, the great body of the laboring classes were in a state of bondage, and looked to their feudal lords for maintenance. The obligation to provide for their slaves, or serfs, seems to have been fully recognized, so that many encountering, in a state of freedom, the miseries of want, went back to bondage as a refuge from destitution. The villeins in Saxon England were attached to the soil, and received from their lord a portion of land for the support of themselves and their families. But the church of Rome constituted herself the great receiver and dispenser of alms. The rich monasteries and abbeys distributed doles to the poor.

In most states of continental Europe, the church remains to a larger or smaller extent the public almoner, the state only stepping in to supplement the offerings of the church and voluntary charity when they become deficient. The disseverance from the church is hardly anywhere so complete as in England. The laws of different countries vary as to the degree of want entitling a pauper to relief, the extent to which the right to relief is matter of positive right, the conditions which give rise to a claim of relief, and the incidence of taxation. In the Netherlands, a title to relief is acquired by birth, or by having inhabited the same place uninterruptedly for six years. In Sweden, such title as the law allows is conferred by inhabitancy in the parish or town, if the applicant, being above 45 years of age, has been entered on the list of tax-payers. In Norway, the right is acquired by a residence of two years; in Denmark, of five years. By the Prussian poor-law of 1842, the duty of relief falls on the commune of which the person applying was expressly admitted a member, in which he has acquired a regular abode, which he has occupied for a year, or in which he has been living for three years after attaining full age. In Sleswick-Holstein, the right to relief in a commune is acquired by birth; also by 15 years' residence after the age of 18, the latter mode of acquiring it being competent to foreigners. In Saxony a settlement is acquired by birth, express gift, or purchase of a house and 5 years' residence.

In Spain the state supports several asylums for lunatics, the blind, and deaf and dumb. It also distributes a large sum annually among the provinces for the relief of the poor—each province being bound to raise double the amount received from the state. The state also steps in for the relief of great calamities, and devotes a certain sum annually for the assistance of unfortunate Spaniards abroad. A general directory of the charitable and sanitary services superintends the parochial bodies charged with the distribution of assistance to the poor.

In Austria each commune is charged with the relief of the poor. All who have legal domicile, or, being unable to prove their domicile, are resident in the commune, are entitled to relief out of the general assessment. There is no special rate, and the administration is strictly municipal. In many provinces private charity is associated with public assistance, administered by the curé, a few chosen inhabitants, who are called "fathers of the poor," and an officer accountable to the commune. This system is called the "poor's institutes;" and their funds are principally derived from private sources; but they receive a third part of the property of ecclesiastics who die intestate, and certain fines, etc. Applicants are subjected to minute inquiry as to the cause of poverty, and a weekly allowance is made on a scale according to age and necessity. The infirm poor, who have no relatives to reside with, are taken into hospitals established in almost every commune, where they receive, besides lodging, fire, and light, clothing, medical care, and a small allowance in money to provide for their food and other wants. Children are either provided for in the homes of their parents, put into asylums, or boarded with people of probity, who receive a monthly payment, as in Scotland. The welfare of these children is superintended by the curés, the maires, and the sanitary officers of the commune. Foundlings, lunatics, the blind, deaf, and dumb, are provided for by the state. Vagrancy is punished, and parents permitting children under 14 to beg are liable to three months' imprisonment. Able-bodied vagrants are sent to houses of correction, and kept to work. Pawnbroking is a charitable institution in Austria, under government control, and many pawnbroking establishments rest on endowments, and lend without interest. The trade is forbidden to private persons.

In France the relief of the poor is not compulsory, in as far as its distributors may, after making inquiry, refuse relief, except in the case of foundlings and lunatics. The minister of the interior has a general superintendence of the machinery of relief, as well as the immediate administration of many large hospitals and refuges. He also assists a great number of private charities. The other ministers of state give assistance on the occurrence of great calamities. The departmental funds are called upon for the compulsory relief, but the commune is the main source of public assistance. Its duty is to see that no real suffering remains unrelieved, and that the nature of the relief is such as can most easily be discontinued when the necessity ceases. The commune encourages and stimulates voluntary charities, and receives gifts for the benefit of the poor's fund. Except in Paris, the administration of the hospitals, and of the relief given at the homes of the poor, are under different management, the communes only interfering to supplement the funds of the hospitals, when these are insufficient. The maire is president both of the administration of the hospitals and of the body for giving out-door relief (the *bureau de bienfaisance*). During industrial calamities, the poor are sometimes employed in work-shops supported by the public, and in public works. In Paris, since 1849, there has been a responsible director set over all the charities of the city. He manages the out-door relief through the medium of the committees of assistance, formerly called *bureaux de bienfaisance*, in each arrondissement. He is under the inspection of a council, composed as follows: The prefect of the Seine (president), the prefect of police, two members of the municipal council, two maires or deputy-maires, two members of the committee of assistance, one councilor of state or a master of requests, one physician and one surgeon practicing at the hospitals, one professor of medicine, one member of the chamber of commerce, one member of the council of prud'hommes, and five members taken from other classes than those above mentioned. Begging is forbidden, and punished, wherever there are establishments for the relief of the poor.

In the Hanse towns, there were introduced, in 1788, a system of voluntary contributions aided by fixed subsidies from the government. This at length resulted in government supplying all deficiencies, which in the last few years have been 80 per cent of the cost of the general poor relief. In Holland pauper colonies have been supported by government for the last 40 years. Vagrants, after a short imprisonment, are sent to one of these, under a system of discipline quite as rigorous as an Irish intermediate prison. Paupers of good character are sent to maintain themselves and their families, by agricultural labor, in free colonies. The working of the system is pronounced costly and unsatisfactory.

In America, the system is very similar to our own. Every man is entitled by law to relief from the town of his settlement, the rate being assessed on whole towns, and not on parishes. The states have their own poor-laws, but paupers are removable from one state to another. Any American becoming a pauper loses his state rights. The acts concerning work-houses and paupers in the revised code of Massachusetts may be taken to represent generally the state of the law throughout the Union. The former provides "that any town may erect or provide a work-house for the employment and support of all poor and indigent persons that are maintained by, or receive alms from the town; all persons who, being able to work, and not having means to maintain themselves, refuse or neglect to work; all persons who live a dissolute, vagrant life, and exercise no ordinary calling or lawful business, and all such persons as spend their time and property in public-houses, to the neglect of their proper business, or by otherwise mis-spending what they earn, to the impoverishment of themselves and their families, *are likely to become chargeable to the town or the commonwealth.*" The idle and the vagrant may be committed to the work-house, and kept to labor, as in a house of correction. There are provisions for enforcing the claims of kindred, and for the immediate relief of strangers. The administration is in the hands of overseers, who have discretion as to the mode of relief.

The annals of the poor in England are neither short nor simple. Severe enactments for the repression of vagabondage and mendicity date from a very early period. In ancient Saxon times, the householder was bound to provide for the laborer, and men who had no master were, by the Folkmote, assigned to some householder; but when freedom began to prevail, this state of things naturally came to an end. No master was bound to provide for the freeman, and when he failed to provide for himself, by honest labor, he generally took to vagrant begging, often to violence. The statute of Winchester (13th Ed. I., 1285) shows the poor utterly uncared for, and the roads infested by vagrant robbers. Up to the reign of Richard II., the sole idea of English rulers was to treat pauperism as a crime, and repress it by punishment, and by the most unjust and absurd restrictions on the freedom of labor. The 23d Ed. III. forbids giving alms to vagrants, on pain of imprisonment; then also the laws of settlement had their origin in the attempt to chain the free laborer to the land. See SETTLEMENT. The 12th Richard II. (1388), c. 7, is the first statute that makes provision for the impotent poor. The statutes of Henry VII. endeavor to carry out, by the severest measures, the system of repression. The 27th Henry VIII. c. 25 (1535), introduced the principle of compulsory assistance, though it was by way of voluntary alms. Each parish was ordered to receive and provide for the impotent, and set the able-bodied to work. Alms were to be collected into a general fund, and indiscriminate almsgiving was forbidden, on pain of forfeiture of ten times the value given. The sturdy beggar was treated without mercy, was to be whipped when first caught, next to have his ear cropped, and for a third offense, to suffer death, as a felon and enemy to the commonwealth. This is repealed by 1st Ed. VI. c. 3 (1547), because "through foolish pity, it is rendered of non-effect." Not much milder, to modern ideas, seem the substituted penalties—viz., branding, on first conviction, with a V on the shoulder, and being adjudged a slave for two years, to be claimed by any one, fed on bread and water, and caused to work by beating, etc. Running away from this tender treatment was punishable with S branded on the face, and slavery for life to the town or parish, on the roads of which the incorrigible vagrant was to work in chains, at the penalty of the town or parish. Other two acts of Edward's reign return to earlier and considerably milder measures of restraint. A little urging was now found necessary to obtain funds for the maintenance of the poor. The collectors were gently to ask every man and woman at church what they would give; but if one could not be persuaded, the bishop was to send for the recusant, and use "charitable ways and means." At length, the 5th Elizabeth, c. 3 (1563), provided that he who obstinately refused to give should be handed over to the more persuasive arguments of the justices, who were empowered to tax him at their discretion, and send him to jail for default. Ten years later, the power of compulsory assessment is given to the justices, and abiding-places are ordered to be provided for the aged and infirm. These statutes culminated in the 43d Elizabeth, c. 2 (1601), which has formed the basis of the poor-law system of England up to the present time. It taxed every inhabitant of every parish for the relief of the poor. It directed the justices in every county to appoint three or four substantial householders in each parish to be overseers of the poor, along with the churchwardens. It ordered the relief of the impotent, and the apprenticing of children, and the providing of work for the able, by means of "a convenient stock of flax, hemp, wool, thread, iron, and other necessary ware and stuff." The great act of Elizabeth came but slowly into operation. Up to the reign of Charles I. there were many parishes in which no rate was assessed, and which turned away their poor; but the great evils had been remedied, and there is little legislation on the subject for the next hundred years. The 3d William and Mary, c. 2 (1691), an act relating chiefly to settlement, provides that the persons to be relieved be registered and examined by the vestry, because evils had arisen out of the unlimited power of the churchwardens and overseers giving relief "for their own private ends," by which the charge on the parish was greatly increased, contrary to the true intent of the statute of Elizabeth. This act also gave power to the justices to order relief in cases of emergency, a provision which afterward became a fruitful source of difficulty. The evils henceforth complained of were, that many had thrown themselves on the rates who ought to have been supporting themselves independently of such aid; that pauper labor was found interfering with and displacing industrial labor; that the overseers were acting with unchecked dishonesty; and justices, with unrestrained liberality, ordering the money of the industrious and prudent to be spent upon the idle and improvident. Efforts were made to remedy these abuses throughout the reigns of the first three Georges, by making the justices act with the overseers, by rendering the overseers accountable to the parishioners by means of returns and the power of inspection, and by the offer of the work-house to all applicants for relief. This last provision, made in the reign of George I. (9th Geo. I. c. 7, 1723), substituted what is called in-door relief, for the allowance made to the poor at their own homes, and introduced the work-house system. All who refused to be lodged in the house were to be struck off the poor's-roll, and refused relief. A great increase in the number of work-houses took place; guardians were appointed to guard the pauper children from neglect and improper conduct, and other attempts to improve their administration made; work-house unions were also introduced by an act called Gilbert's act (1782), and a succession of acts passed for the protection of parish apprentices. Toward the close of the 18th c. a great relaxation took place in the treatment of the poor. The 36th Geo. III. c. 10 and 23 (1796), increased the amount, and extended the application of relief. It repealed the act forbidding relief to those who refused the work-house, and allowed relief to be given in aid of wages. Henceforth, out-door relief became the rule under a variety of systems, of which the complaint was justly made, that they turned the poor-laws into a mode of paying wages. In 1801 the amount of the rates was reckoned at £4,000,000. In 1820 it had risen to £7,330,254. In 1817 a commission of the house of commons stated their opinion, that, unless checked, the assessment would swallow up the profits of the land. Though the two vestry acts, which resulted from the commission appointed in 1817, seem to have done something to remedy the evils complained of, a new commission to inquire into the operation of the poor-laws was found necessary, and appointed in February, 1832. The evidence brought before this commission revealed a disastrous state of things. The independence, integrity, industry, and domestic virtue of the lower classes were in some places nearly extinct. The great source of the evil was shown to be the relief afforded to the able-bodied on their own account, and that of their families, in aid of wages. This aid at first reduced the expenditure in wages, and found favor with farmers and magistrates, who framed scales of relief in accordance with the wants of the people, so that they began to be paid for their necessities, and not for their industry, and fell into the temptation of increasing the former, and neglecting the latter. Five modes of out-door relief were found in operation: 1. Relief without labor; 2. Allowance given, in aid of wages, according to the number of the laborer's family; 3. The roundsmen system, the laborers being let out, by the parish, among the employers round; 4. Parish work, generally on the roads; 5. The labor-rate, the rate-payers preferring to divide among them the pauper labor, and to pay for it, however valueless, instead of raising a rate. Diminished industry ate away the very root of capital. Farmers turned off their men, or refused to employ them at fair wages, thereby causing a surplus of unemployed labor fraudulently; they then took them back from the parish at reduced wages, paid out of the rates. Under the system of allowance, there were parishes in which every laborer was a pauper, paid more for idleness than he could get for labor, paid more if he took a pauper wife, and still more for every pauper child. Paupers married at 17 and 18 years of age, and claimed the allowance the day after their marriage; and from parish after parish came the reply to the queries of the commissioners, "All our able-bodied laborers receive allowance." No poor man in such parishes could save; if industrious and thrifty, and it was known that he had a fund of savings, "he would be refused work till the savings were gone," and he had come down to the pauper level. This had gone on, till in many places pauperism swallowed up three-fourths of the rent. Nor was the mal-administration confined to the rural districts; the evidence showed that it extended all over the country, and into the manufacturing towns, where the out-door relief was a source of constant imposture. The administration of in-door relief was also full of abuses, from want of classification, discipline, and employment. Better food and lodging was provided for idle paupers than working-people could procure—better, even, than could be afforded by many of the rate-payers. In 1834 the commissioners reported that they found the administration "opposed to the letter and spirit of the law, and destructive of the welfare of the community." The commissioners strongly laid down the principle, that the condition of the pauper ought to be below the lowest condition of the independent laborer, because every penny bestowed in rendering the condition of the former more eligible than that of the latter, is a bounty on indolence and vice, and recommended: 1. The cessation of out-door relief; 2. A central authority to control the administration; 3. Unions for the better management of work-houses, and the classification of their inmates; and 4. A complete and clear system of accounts. The bill embodying these recommendations was brought in, March 17, 1834, passed its second reading in the house of commons with only twenty dissenting votes, and became law on the 14th August as the 4th and 5th Will. IV. c. 76. This act was not a change of law, but of administration. The orders of the new board restricted overseers, on the formation of a union, to the collection of rates; appointed paid relieving-officers to dispense relief under the directions of the unpaid boards of guardians; required the gradual withdrawal of out-door relief; and enforced classification and discipline in the work-houses. A rapid formation of unions took place under the new board. In the first eight months 112 were formed out of 2,066 parishes. The pauperized districts experienced a great and immediate relief, numbers of paupers going off when they found that relief involved adequate work, or the strictly-disciplined work-house; wages rose, and the expenditure was reduced on an average 20 per cent. At the accession of George I. in 1714, the poor-rates amounted, as nearly as can be estimated, to £950,000, equal to 3s. 6¾d. per head on the population of 5,750,000. At the accession of George III. in

1760, the population had increased to 7,000,000, the poor-rates to £1,250,000—an average of 3s. 3¾d.; while in 1834, the population, estimated from the last census, was 14,372,000, and the money expended in relief, £6,317,255—equal to 8s. 9½d. per head. In three years, the operation of the amendment act had reduced the expenditure one-third, viz., to £4,044,741. In 1848 the commissioners were exchanged for a public board, which is one of the government departments, with a president, in whom has been vested the power of the commissioners, and who holds office as one of the ministers of the crown. There are 631 unions. In 1860–61 the number of poor receiving relief in England was about 850,000, about 4¼ per cent on the population: of these, about 140,000 were relieved in work-houses. The commissioners were unable to withdraw out-door relief, which continues to be in England the most important item. With the aged, the sick, and orphans, the guardians deal at their discretion; but stringent rules for the relief of the able-bodied are in operation under the board, whose orders have the force of laws. In the rural districts, guardians are prohibited from giving relief to the able-bodied out of the house, unless under a supplemental order, in emergency. For other places, the general rule forbids relief to be given in aid of wages, and requires work to be supplied. Exceptions are made by the board on the application of the unions when necessity arises, as in the recent case of the cotton districts. The expenditure is strictly guarded and examined by public auditors, of whom there are fifty-four for England. A district medical officer, of whom one or more are appointed for each union, attends to all cases of sickness among the poor.

Scotland and Ireland have been legislated for separately. Their poor laws are similar to the English in principle and practice; both are administered by a central board, which supervises the local bodies charged with relief, and in both the rate is levied on the annual value of real property. The present system in Scotland was instituted by the 8th and 9th Vict. c. 83 (1845). Scotland is divided into 883 parishes, some of them combined for poor-house accommodation. The relief is administered by a parochial board, appointed by the rate-payers, the burgh magistrates, and the kirk-session. They appoint inspectors of the poor, who act as relieving officers. The Scotch law differs from the English and Irish in allowing no relief to able-bodied adults. Claimants must be aged, infirm, or disabled. Out-door relief is the rule. As regards the working of the Scottish poor-law, its great and acknowledged defect is the constant and costly contest respecting settlements, or right to fix claims on particular parishes. Scotland had, in 1874, 64 poor-houses for 406 parishes, having a population of 2,407,441. Ireland had no poor-laws until the year 1838, when they were introduced by the 1st and 2d Vict. c. 56. For the purpose of relief, Ireland is divided into 163 unions of townlands or parishes. Each union has a work-house managed by a board of guardians, elected by the rate-payers. Every destitute person has an absolute right to relief, which is administered almost entirely in the work-house. The average yearly population of the United Kingdom during the 10 years ending 1870 was 29,694,138; average paupers in each year, 1,140,185, or 3.9 per cent. They were apportioned as follows:

	Population.	Paupers.	Percentage.
England	20,998,332	973,860	4.6
Scotland	3,044,919	100,927	3.3
Ireland	5,650,897	65,398	1.2

The total expenditure in the United Kingdom during the 10 years was £80,901,456, or an annual charge of 5s. 5½d. per head on the average population of the period, apportioned as under:

	Amount of Assessment.	Per head per annum.	
	£	s.	d.
England and Wales	67,286,674	6	4¾
Scotland	6,191,066	4	0¾
Ireland	7,423,716	2	7½

To look back 10 years, the rate which, at the end of the financial year 1861, was 5s. 9d. a head on the population, was 6s. 4½d. two years after—a fact due to the cotton famine. Applying similar calculations to the 5 years 1871–75 give the following results: estimated annual average population of the United Kingdom, 32,129,865; annual average of paupers, 1,109,608, or 3.4 per cent, distributed thus:

	Population.	Paupers.	Percentage.
England and Wales	23,855,535	920,030	3.9
Scotland	3,430,930	112,132	3.25
Ireland	5,343,400	77,446	1.4

The total expenditure for the same period was £47,532,756, or an annual average charge of 5s. 0¾d. per head of population, allocated thus:

	Amount of Assessment.	Per head per annum.	
	£	s.	d.
England and Wales	38,739,734	6	7¾
Scotland	4,300,842	5	1¼
Ireland	4,492,680	3	5

There is no poor-law in our Australian colonies, but benevolent asylums for the infirm and destitute have become general, and hospitals are numerous in all the rising towns in the gold-fields.—Compare Böckh's *Public Economy of Athens*, translated by sir G. C. Lewis; sir George Nichol's *History of the Poor-Laws;* Emningham's *Poor Relief in different parts of Europe*, revised by E. B. Eastwick (1873); *Report of the Poor-Law Commissioners* (1835); *Reports of the Poor-law Commission and Poor-law Board* from 1835 *to* 1875.

POOR LAWS. The fundamental rule as to the relief of the poor was, that each parish in England and Wales is bound to maintain its own poor. For the purpose of providing the requisite machinery, overseers are required to be appointed in each parish every year on Mar. 25, or within a fortnight following; and these, along with the churchwardens, who are *ex officio* overseers, have the duty of providing the requisite funds. See OVERSEERS. This is done by means of a poor-rate, which the churchwardens and overseers may levy on all the occupiers of land in the parish, after such rate has been confirmed by the justices. The rate specifies a certain sum in the pound which is to be levied, and the annual value of the various lands is then specified, and the amount is thus easily computed. The rate is thus a local tax on the occupier of the land, and not on the owner, unless he himself is also occupier. In all cases, the duty of raising the funds attaches to the overseers; but the actual distribution and application of them are not always in their immediate control. Owing to the mischiefs arising from the officials of each parish distributing the funds at their discretion, without uniformity of plan, a central controlling power was created in 1884, in the shape of the poor-law board; and authority was given to combine various parishes into one poor-law union, for the purpose of greater uniformity as well as economy. When a union is formed, the control of the expenditure is chiefly vested in the guardians of this union, who are elected by each parish, and who supervise the management of the union work-house. They order the overseers of each parish to raise their due proportion of funds, by a contribution order issued to such overseers, who are thereon bound to levy the amount by including it in the next poor-rate. The guardians are bound to contract for the provisions, clothing, fuel, etc., supplied to the work-house, by means of sealed tenders, unless the quantity is less than a stated amount. All the controlling powers formerly vested in the poor-law board are now transferred to the local government board. The principle on which relief is administered to the poor is, that the condition of the pauper should not be so comfortable as that of the lowest independent laborer; otherwise, idleness and imposture would be encouraged to an indefinite extent. The guardians profess only to relieve destitution already existing, and not to enable persons to keep off impending destitution. Hence they only supply the bare necessaries of life. They cannot, for example, advance or lend money to set up a poor person in trade. Minute regulations are contained in the consolidated poor-law orders of the board as to the classification of paupers in the work-house, mode of admission, diet, discipline, and out-door relief. With regard to out-door relief and able-bodied paupers, it is provided that every able-bodied person requiring relief from any parish shall be relieved wholly in the work-house, together with his wife and family, if any, and if not otherwise employed. But the relief may be given out of doors in cases of sudden and urgent necessity, of sickness, accident, and a few other cases. In general, relief is confined to persons actually residing in some place within the union, except in case of casual destitution, or sickness and accident. Whenever out-door relief is given to an able-bodied person, half of it is to be in the form of articles of food or fuel. Relief is given only weekly, where the pauper is not required to be received into the work-house. No relief is to be given to able-bodied persons while they are employed for wages or hire by any person; and every able-bodied male person, if relieved out of the work-house, shall be set to work by the guardians, and kept so employed while he continues to receive such relief. The law with regard to the relief of the poor is so far qualified, that wherever a person applies for parochial relief, if he or she has a father or grandfather, mother or grandmother, or child, who is able to maintain such pauper, then the parish officers can obtain an order from justices to compel such relative to contribute a sum toward such maintenance. So husbands or fathers of paupers are bound to contribute to such maintenance. In all cases, the pauper is relieved either in the work-house or out of the work-house, according to the regulations of the poor-law orders. In some cases, the guardians or overseers may employ the poor in public works; but this is seldom done, except on occasions like the Lancashire distress. The law as to the settlement of the poor is somewhat intricate, and gives rise to much litigation. There are various grounds on which this settlement is acquired. Thus, every person has, *primâ facie*, a settlement in the parish where he was born, until some other is proved; and there are so many qualifications, that it is seldom a birth-settlement is resorted to. By marriage, a woman immediately acquires the settlement of her husband, if he has one, whether the husband be an Englishman or a foreigner. If the husband has no settlement, then the wife is thrown back on her maiden settlement. Formerly, a person acquired a settlement in a parish by hiring and service, and by residence for 40 days under such hiring; but since 1834, no such settlement can be acquired. If any person shall be bound an apprentice by indenture, and reside 40 days under such apprenticeship, he or she acquires a settlement thereby. So whoever shall rent a tenement in a parish, and actually occupy the same, and be rated to the poor for one whole year, the rent being not less than £10, and paid by the person so actually occupying the tenement, shall acquire a settlement. So a person acquires a settlement by acquiring an estate in land, however small in value, and residing 40 days in the parish. So, if a person buy an estate, and the consideration amount to £30 at least, he shall thereby acquire a settlement. Formerly, a settlement was acquired by serving a public annual office, such as that of constable, overseer, etc.; but no settlement is now acquired on that ground. Unless a pauper has acquired a settlement on one or other of the grounds before mentioned in the parish or union where he receives relief, he is liable to be removed compulsorily to the parish where he last acquired a settlement. Certain persons, however, cannot be removed, and these are called irremovable paupers. Such are those paupers who have resided for one whole year in the parish or union in which they became destitute. The mode of computing this one year is, however, somewhat difficult in certain cases. The expense of maintaining the poor generally is paid out of the common fund, and not by each parish in the union. When a pauper is sought to be removed, it is necessary to take him before two justices of the peace for examination; and on proper evidence of his settlement, the justices will make the order of removal, which is an authority to the overseers to take or send the pauper to the overseers of the parish of settlement. If, however, the pauper is too ill at the time to admit of removal without danger, the justices may suspend the order of removal till he is recovered. Whenever a pauper is to be removed, the removing union is bound to give notice to the union of settlement; and it is on these occasions that so many obstinate and costly litigations take place as to which is the union of settlement. Much litigation was avoided by substituting a union for a parish as the test. The union also may appeal to the court of quarter-sessions against the removal order; and the quarter-sessions may state a case for the opinion of the court of queen's bench, if any nice point of law should arise, as frequently happens.

In Scotland, there was no systematic provision for the relief of the poor until 1845, when the statute of 8th and 9th Vict. c. 83 was passed. By this statute, a central board (called the board of supervision) was established, which controls the parochial board of each parish or union of parishes in a manner similar to the poor-law board in England. A settlement can be acquired in Scotland by residence of five years. Children follow the settlement of their parents, and wives that of their husbands; and if no other settlement be proved, then the settlement of birth is liable. In Scotland, the mode of assessment differs from that in England, where only the annual value of lands and tenements can be rated in the hands of the occupier. The parochial board had the option of three modes of assessment: 1. One half to be paid by owners, and one half by the occupiers; 2. One half to be paid by owners of lands, and the other half to be paid by all the inhabitants, according to means and substance other than lands; 3. Assessing owners of lands and other inhabitants ratably according to their means and substance. But by a later act of 24th and 25th Vict. c. 37, the mode of assessing means and substance is abolished. It will thus be seen that in Scotland the poor-rate can never be imposed wholly on the occupier as it always is in England.

In Ireland, a poor-law act was also, in 1838, passed, and numerous amending statutes have followed, the code of laws being substantially founded on the English acts.

There are special acts of parliament regulating the conditions on which paupers are removable between England, Scotland, and Ireland respectively.

POOR LAWS (*ante*), in the United States, are of local enactment. In some cases general laws have been passed by the state, but the town authorities usually adopt regulations for the care of the poor. The increase in pauperism in the years of business depression following the inflation period has led several states to pass what are known as "tramp-laws," defining more or less definitely the class of paupers generally called tramps, and making it a criminal offense for them to wander through the state without "visible means of support." The punishment for this offense in Connecticut is a year's imprisonment. Laws of this kind have met with criticism, both on the ground of unconstitutionality, and as harsh and oppressive. They have been generally administered with moderation and discrimination, and have without doubt been beneficial. In small towns the care of the poor is the duty of the board of selectmen. In some the barbarous custom of farming out the town poor to the lowest bidder still exists. As that town is required to support a pauper in which he has a legal settlement, and as the laws as to what constitutes such a settlement differ widely in the various states, legal questions are constantly arising. It would be impossible to give here even a summary of the state legislation as regards settlement. As a rule, married women follow the settlement of their husbands; legitimate children that of the father, or, if he have none, of the mother; and illegitimate children, of the mother. Settlement may be acquired in some states by residence for a certain time; others require residence and payment of taxes, or ownership of property to a fixed amount. The longest period of residence required is five years, in Maine, and the shortest 30 days, in Nebraska. Apprenticeship, followed by residence for one or more years, in most cases gives a settlement.

POORE, Ben Perley, b. Mass. 1820; edited the *Southern Whig* in Georgia 1838–40. He was historical agent of Massachusetts in France 1844–48, and during the same period foreign correspondent of the Boston *Atlas*. After his return he edited the Boston *Daily Bee*, and the *American Sentinel*. Since 1854 he has been Washington correspondent of the Boston *Journal*. Among his writings are *Rise and Fall of Louis Philippe* (1848); *The Conspiracy Trial* (1865); and *The Political Register and Congressional Directory* (1879).

POOR, LITTLE SISTERS OF THE. See SISTERHOODS.

POOR-RATE. See POOR; OVERSEERS.

POOR'S-ROLL, in the practice of the law of Scotland, means the list of poor persons who are litigants, but unable to pay the fees of court, and therefore are allowed to sue *in formâ pauperis*. As this is considered a privilege, and enables the person to secure the services of counsel and agents gratuitously, it is only granted on production of a certificate by the minister of the parish and two elders, setting forth his circumstances to their own knowledge, and his general poverty. Notice is given of this to the adverse party, who is allowed time to inquire and oppose the application. When the court is satisfied of the poverty, the next thing is for the court to remit the matter to the counsel for the poor, of whom there are always two annually appointed by the faculty of advocates, generally young counsel, for the purpose; one of these counsel reports whether there is a *probabilis causa*, i.e., a good cause of action. If this report is made, it is considered conclusive, and the party is put on the poor's-roll. This warrant remains in force for two years, and during that time the pauper is exempt from all fees of court, and has the gratuitous services of counsel and agents. This provision for enabling paupers to carry on litigation, which is so complete in Scotland, is unknown in England or Ireland; for though a party may also be allowed there to sue *in formâ pauperis*, no provision is made by the court for giving him the gratuitous services of counsel and attorney; nevertheless, these sometimes volunteer to act gratuitously. See IN FORMÂ PAUPERIS.

POPAYAN, a city of the United States of Colombia (New Grenada), South America, stands in a fertile plain, 6,000 ft. above sea-level, on the Cauca, in lat. 2° 27′ n. It contains a cathedral and a number of conventual edifices. It was founded in 1537, and was the first city built by Europeans in this region. Under the Spaniards it rose to considerable importance; but an earthquake in 1834, and the continued unsettled state of the country, have done much to reduce it. It is still of some consequence as a mart for agricultural produce. A great commercial road, about 1000 miles in length, leads from Popayan to Truxillo, in Peru. Pop. 20,000.

POPE (Gr. *papas;* Lat. *papa*, father), the title of the bishop of Rome, and supreme pontiff of the Roman Catholic church; applied also to all priests of the Greek and Russo-Greek church. Under very many heads occasions have arisen requiring reference more or less detailed to the authority and the privileges ascribed to the bishop of Rome by the church of which he is the head. We propose in the present article to explain briefly the titles of the pope, the manner of his election, the nature and functions of his office, and the authority ascribed to him by the different schools of Catholics; and finally the chronological succession of the bishops of Rome from the earliest ages to our own day.

1. The name "papa" (q.v.)—the Latin equivalent of pope—was originally used of all bishops The first known writer who applies it to the Roman bishop as his specific title is Ennodius of Pavia, in the latter part of the 5th c., who thus addresses pope Symmachus. It is used also by Cassiodorus; and from his time gradually came to be reserved to this application, but it did not lose entirely its old and general use for many centuries later. In the modern ecclesiastical vocabulary the pope is called the "sovereign pontiff," the "vicar of Christ," the "head of the church," the "holy father," etc. He subscribes himself, since St. Gregory the great, *servus servorum Dei* (servant of the servants of God); and he is addressed as your holiness, your beatitude, etc.

2. The office of pope is elective. The electoral body, according to the present usage, is the college of cardinals. Primitively, the pope, as the other bishops, was elected by the clergy and people, although the rights of both were not the same. Some elections having been attended with violence, the electoral body was by degrees limited. At length, by a decree of Pope Nicholas II. in 1059, the right of election was vested in the cardinals. Provision was thus made for a representation of all the ancient electoral bodies; the cardinal bishops representing the bishops of the Roman synod, the cardinal priests, the parish clergy, and the cardinal deacons, the heads of the popular electoral districts (*regiones*) of the city. Preparatory to an election, the cardinals are shut up in what is called "the conclave," all communication with the outer world being interrupted until the election shall have been made. A simple majority of voices does not suffice—two-thirds of the cardinals must vote for the same candidate. There are four modes of election—"scrutiny," "access," "compromise," and "inspiration." Twice a day during the conclave each cardinal deposits, in a chalice placed on the altar, the name of his candidate. If the requisite number of votes are not found for any one, the papers are at once burned, and the smoke of the burning votes is a signal to the expectant crowd outside that no election has taken place. This is called the "scrutiny." If votes be added to those already given for one candidate, so as to make the required two-thirds, it is called "access." If the cardinals of two parties unite, it is called "compromise." If, by a public movement, a particular candidate be carried as if by acclamation, the election is said to be by "inspiration." The present pope, Pius IX.,

was elected in this way. The greater Catholic powers—France, Austria, and Spain—were formerly understood to have the privilege of placing a veto upon the election of *one* candidate; but this right was vague and undefined, and had no formal foundation in law. It is required by long usage, as a condition of election, that the candidate shall be an Italian. After election, the pope is enthroned, enters upon possession of his see, and finally, is solemnly crowned. The ceremonial of consecration is very splendid and deeply impressive. One of the ceremonies—that of burning a bunch of flax before him, with the words, "Holy father, thus passeth away the glory of the world!"—has often been cited for its highly symbolical character, as well as for its dramatic effect. Cardinals, in order to vote, must be present at the conclave—no voting by proxy is permitted. Some of these conditions are practically set aside by the cessation of the status of the pope as an Italian temporal sovereign, and it is not unlikely that the forms of election may be modified by special legislation. It has even been alleged that the present pope has prepared a special bull regulating the time, place, and order of the election of his successor.

3. The general nature of the office of the pope may be inferred from his reputed character as successor of St. Peter, and vicegerent of Christ on earth, whence follow all the powers necessary for the practical government of the church. Hence he is held (1) to possess over the entire church, and each of its parts, a supreme authority, not indeed arbitrary, but regulated by the law of God and by the canons. He has power (2) to examine and decide authoritatively all controversies; (3) to convoke councils; (4) to revise and confirm their decrees; (5) to issue general decrees, whether upon discipline and morals, or upon doctrine; (6) he is the center of communion, separation from which involves the forfeiture of the communion of the whole church; (7) he has *ultimate* authority to appoint bishops in all parts of the church, and however this right may be exercised in the first instance, as by the sovereign, by the clergy, or by a synod of bishops, it rests with him to confirm episcopal elections, no matter how made, and to grant "canonical institution;" (8) he can also deprive bishops and set others in their place, and can even, in cases of great emergency, suppress bishoprics and change their limits according to existing requirements; (9) he has authority to judge of the doctrine taught in particular books, or by particular individuals, and to pronounce authoritatively as to its conformity with the Catholic faith, or the contrary. This privilege formed the subject of the great controversy with the Jansenists as to what are called "dogmatic facts."

4. All Catholics are agreed that the pope, as primate, possesses, by divine law, and in virtue of his office, full governing authority over the entire church. Of the exercise of such power they find traces in history from the earliest times. Roman Catholic historians trace the history of the pope's primacy in St. Clement's letters to the church of Corinth, in the action taken by Victor in the Paschal controversy, and by Stephen and Cornelius in the controversy on rebaptizing heretics; in the deposition of Marcian, bishop of Arles, at the instance of Cyprian, by pope Stephen; in the leading part taken by the popes in the condemnation of Donatus and of the Pelagian heresy; and, perhaps, more than all, in the appeals made from various parts of the church by persons excommunicated by their own bishops, and the rehearing at Rome of such causes, and the confirmation or reversal of the sentence according to the result of the trial. These several facts, however, although to Catholics they appear evidences of the papal supremacy, are explained by Protestant writers in a sense which does not suppose any permanent supremacy on the part of the Roman see, and which they hold to be reconcilable with the full independence of national churches; and it is admitted by Catholics themselves, while they contend that the instances to which they appeal imply a real exercise of primacy from the beginning, that the details of that primacy have undergone a gradual and extensive development in the progress of the church. Up to the date of the late Vatican council great differences of opinion existed between the Gallican and the ultramontane schools as to the extent and nature of the papal authority, whether decrees of doctrine or in the government of the church. As to the former, all agreed that the judgment of the pope, in concert with the body of bishops, was infallible; but they differed as to papal decrees on doctrine issued by the pope alone, *ex cathedrâ*, and addressed to the whole church, although both agreed as to the duty of respectful obedience on the part of all, until the general sense of the church should have been ascertained; and should no reclamation on the part of the church take place, the decree of the pope was held to be, in the opinion of both the contending schools, as infallible; and the doctrine propounded therein was allowed to be recognized as a question of faith, which had been sanctioned with the ultimatum of infallibility. See GALLICANISM. But the ultramontanes held that a doctrinal decree issued, *ex cathedrâ*, is infallible, *ipso facto*, and independently of any reference to the church dispersed. As to the government of the church, the ultramontanes held the pope to be supreme, and thus to be superior to general councils, and independent of their decrees. The Gallicians, on the contrary, held that a general council is superior to the pope, and has power to bind him by its decrees. Further, the ultramontanes held that the pope is the source of all jurisdiction in the church, and that the bishops derive their powers *through him* from Christ. The Gallicans regarded the episcopal power as received directly from Christ by virtue of the episcopal office. This difference of opinion leads to many controversies of detail as to

the respective rights and powers of the pope and the bishop in the several dioceses, regarding which it is only necessary to indicate the general ground of difference of opinion. With regard to all, it may be said that both on the question of infallibility and on all its practical consequences, the ultramontane view, although not in its most extreme form, has received the sanction of the late Vatican council.

5. The chronology of the papacy in the 1st c. is very obscure. The enumerations in the ancient writers are imperfect, and they differ as to the exact order of succession. The two most ancient catalogues, those of Irenæus and Augustine, differ in more than one particular. The chief difficulty regards Linus and Cletus. The former is believed to have been the vicegerent of Peter during the interval between his first coming to Rome and his final residence there. He would, therefore, have been at once the contemporary of Peter and his successor (though but for a very brief period). The difficulty as to Cletus arises from the doubt whether he be the same person with Anacletus. We subjoin a catalogue drawn up after the most careful modern authorities, and arranged according to centuries:

FIRST CENTURY.	A.D.
St. Peter	41–67
Linus	68
Cletus, or Anacletus	uncertain date
Clement I	uncertain date

SECOND CENTURY.	
Evaristus	about 100
Alexander I	about 109
Sixtus I., Roman	119
Telesphorus, Greek	127
Hyginus, Athenian	138
Pius I., native of Aquileia	142
Anicetus, Syrian	151
Soter, Greek	161
Eleutherus, Greek	170
Victor I., African	185
Zephyrinus	197

THIRD CENTURY.	
Callixtus I., Roman	217
Urban I., Roman	222
Pontianus, Roman	230
Antherus, Greek	235
Fabianus, probably Roman	236
Cornelius, Roman	252
(Novatianus, first antipope.)	
Lucius I., Roman	253
Stephen I., Roman	253
Sixtus II., Roman	257
Dionysius, Greek	259
Felix I., Roman	270
Eutychianus, uncertain	275
Caius, Roman	283
Marcellinus, Roman	296

FOURTH CENTURY.	
Marcellus I., Roman	308
(Marcellinus having died in 304 or 305.)	
Eusebius, Greek	310
Melchiades, African	310
Sylvester I., Roman	314
Marcus, Roman	336
Julius I., Roman	337
Liberius, Roman	352
(Felix II., antipope.)	
Damasus I., Spaniard	366
(Ursicinus, antipope.)	
Siricius, Roman	384
Anastasius I., Roman	398

FIFTH CENTURY.	
Innocent I., native of Albano	401
Zosimus, Greek	417
Boniface I., Roman	418
Celestinus I., Roman	422
Sixtus III., Roman	432
Leo I., Roman, called "the Great"	440
Hilarius, native of Sardinia	461
Simplicius, native of Tibur	467
Felix III., Roman	483
Gelasius I., Roman	492
Anastasius II., Roman	496
Symmachus, native of Sardinia	498

SIXTH CENTURY.	
Hormisdas, native of Frusino	514
John I., Tuscan	523
Felix IV., native of Beneventum	526
Boniface II., Roman	530
John II., Roman	532
Agapetus I., Roman	535
Sylverius, native of Campania	536
Vigilius, Roman	540

	A.D.
Pelagius I., Roman	555
John III., Roman	560
Benedict I., Roman	574
Pelagius II., Roman	578
Gregory I., Roman, styled "the Great"	590

SEVENTH CENTURY.

Sabinianus, native of Tuscany	604
Boniface III., Roman	607
Boniface IV., native of Abruzzi	608
Deusdedit or Deodatus I., Roman	615
Boniface V., Neapolitan	619
Honorius I., native of Capua	625
Severinus, Roman	638
John IV., native of Dalmatia	640
Theodorus I., Greek	641
Martin I., native of Tudertum	649
Eugenius I., Roman	654
Vitalianus, native of Signia	657
Deusdedit II., Roman	672
Domnus I., Roman	676
Agathon, Sicilian	678
Leo II., Sicilian	682
Benedict II., Roman	684
John V., native of Syria	685
Conon, native of Thrace	686
Sergius I., native of Palermo	687

EIGHTH CENTURY.

John VI., native of Greece	701
John VII., native of Greece	705
Sisinius, native of Syria	708
Constantine, Syrian	708
Gregory II., Roman	715
Gregory III., Syrian	731
Zacharias, Greek	741
Stephen II	752
Stephen III., Roman	752
Paul I., Roman	757
Stephen IV., Sicilian	768
Adrian I., Roman	772
Leo III., Roman	795

NINTH CENTURY.

Stephen V., Roman	816
Paschal I., Roman	817
Eugenius II., Roman	824
Valentinus, Roman	827
Gregory IV., Roman	827
Sergius II., Roman	844
Leo IV., Roman	847
In this interval is placed the fabulous pope Joan (q.v.).	
Benedict III., Roman	855
Nicholas I., Roman	858
Adrian II., Roman	867
John VIII., Roman	872
Martin II. (called also Marinus I.)	882
Adrian III., Roman	884
Stephen VI., Roman	885
Formosus, bishop of Porto	891
(Sergius and Boniface VI., antipopes.)	
Stephen VII., Roman	896
Romanus, Tuscan	897
Theodorus II., Roman	897
John IX., native of Tibur	897

TENTH CENTURY.

Benedict IV., Roman	900
Leo V., native of Ardea	903
(Christopher, antipope.)	
Sergius III	904
Anastasius III., Roman	911
Lando, native of Sabina	913
John X., Roman	914
Leo. VI., Roman	928
Stephen VIII., Roman	929
John XI	931
Leo VII., Roman	936
Stephen IX., Roman	939
Martin III. (called by some Marinus II.)	943
Agapetus II	946
John XII, Ottaviano Conti	956
He was the first who changed his name on his elevation.	
(Leo VIII., antipope)	963
Benedict V., Roman	964
John XIII., Roman	965
Benedict VI	972
Domnus II., Roman	973
Benedict VII. (Conti), Roman	974
John XIV	983
(Boniface VII., Franco, antipope.)	
John XV., Roman	985
John XVI., Roman	986
Gregory V., German	996
Sylvester II., Gerbert, native of Auvergne	999

ELEVENTH CENTURY.

	A.D.
John XVII. (May—October)	1003
John XVIII., Roman	1003
Sergius IV., Roman	1009
Benedict VIII., native of Tusculum	1012
John XIX., Roman (in some catalogues reckoned XX.; the diversity arising from a disputed election)	1024
Benedict IX	1033
(Sylvester, antipope.)	
Gregory VI., Roman	1044
Clement II., native of Saxony	1047
Damasus II. (Poppo)	1048
Leo. IX., bishop of Toul	1049
Victor II., bishop of Eichstadt	1055
Stephen X., Frederick, abbot of Monte Casino	1057
Benedict X., by some styled antipope, abdicated	1058
Nicholas II., native of Burgundy	1059
Alexander II., native of Milan	1061
Gregory VII., Hildebrand, native of Tuscany	1073
(Guibert, antipope, assumed the name of Clement III.)	
Victor III., native of Beneventum	1086
Urban II., native of France	1088
Paschal II., native of Tuscany	1099
(Albert and Theodoric, antipopes.)	

TWELFTH CENTURY.

Gelasius II., native of Caieta	1118
Callixtus II., native of Burgundy	1119
Honorius II., Cardinal Lamberto, Bishop of Ostia	1124
Innocent II., Roman	1130
(Anacletus, antipope.)	
Celestinus II., Tuscan	1143
Lucius II., native of Bologna	1144
Eugenius III., native of Pisa	1145
Anastasius IV., Roman	1153
Adrian IV., Nicholas Breakspeare, Englishman	1154
Alexander III., Cardinal Orlando Bandinelli, native of Siena	1159
(Victor, Paschal, and Callixtus, antipopes.)	
Lucius III., Cardinal Ubaldo of Lucca	1181
Urban III., Uberto Crivelli, Archbishop of Milan	1185
Gregory VIII., native of Beneventum	1187
Clement III., Paul, Bishop of Præneste	1188
Celestinus III., Cardinal Hyacinthus, Roman	1191
Innocent III., Cardinal Lotharius, native of Signia	1198

THIRTEENTH CENTURY.

Honorius III., Cardinal Savelli, native of Rome	1216
Gregory IX., Cardinal Hugo, native of Anagni	1227
Celestinus IV., native of Milan	1241
Innocent IV., Cardinal Sinibaldo Fieschi, native of Genoa	1243
Alexander IV., Cardinal Rinaldo Conti, native of Anaqui	1254
Urban IV., James, Patriarch of Jerusalem, Frenchman	1261
Clement IV., Guy, native of St. Gilles, in Languedoc	1265
Gregory X., Tebaldo Visconti, native of Piacenza	1272
Innocent V., Cardinal Peter, native of Tarentaise	1276
Adrian V., Ottobono Fieschi, native of Genoa	1276
John XXI., native of Lisbon	1276
Nicholas III., Cardinal Orsini, native of Rome	1277
Martin IV., Cardinal Simon de Brie, Frenchman	1281
Honorius IV., Cardinal James Savelli, native of Rome	1285
Nicholas IV., Cardinal Jerome, native of Ascoli	1288
Celestinus V., Pietro da Morrone of Abruzzi	1294
Boniface VIII., Cardinal Benedetto Gaetani, native of Anagni	1295

FOURTEENTH CENTURY.

Benedict XI., Cardinal Nicholas, native of Treviso	1303
Clement V., Bertrand of Bordeaux, removed the papal see to Avignon	1305
John XXII., James, native of Cahors, in France	1316
(Nicholas, antipope.)	
Benedict XII., James Fournier, Frenchman	1334
Clement VI., Peter Roger, native of Limoges in France	1342
Innocent VI., Stephen Aubert, native of Limoges	1352
Urban V., William Grimoard, Frenchman	1362
Gregory XI., Peter Roger, Frenchman, restored the papal see to Rome	1370
Urban VI., Bartolomeo Prignano, Neapolitan	1378
(From 1378 to 1410 occurs the great Western schism, during which, in conflict with the line of popes inserted in the catalogue, is found a rival line residing at Avignon—Clement VII., 1378–94; Benedict XIII., 1394–1410. The Council of Pisa, 1410, deposed both rival popes; but Benedict XIII. remained in schism till his death in 1424.)	
Boniface IX., Peter Tomacelli of Naples	1389

FIFTEENTH CENTURY.

Innocent VII., Cosmo Migliorati, native of Sulmona	1404
Gregory XII., Angelo Corrari, native of Venice	1406
Alexander V., Peter Philargius, native of Candia	1409
John XXIII., Cardinal Cossa, deposed by the Council of Constance	1410
Martin V., Otho Colonna, Roman	1417
Eugenius IV., Gabriel Condulmero, Venetian	1431
(Felix, antipope.)	
Nicholas V., Cardinal Thomas, native of Sarzana	1447
Callixtus III., Alfonso Borgia, Spaniard	1455
Pius II., Æneas Sylvius Piccolomini, native of Siena	1458
Paul II., Peter Barbo, native of Venice	1464

	A.D.
Sixtus IV., Francis della Rovere, Genoese	1471
Innocent VIII , Gian Battista Cibo, Genoese	1485
Alexander VI., Rodrigo Lenzoli Borgia, Spaniard	1492

SIXTEENTH CENTURY.

Pius III., Francis Todeschini Piccolomini	1503
Julius II., Julian della Rovere, Genoese	1503
Leo X., Giovanni de' Medici, son of Lorenzo the Magnificent	1513
Adrian VI., native of Utrecht	1522
Clement VII., Giulio de' Medici, nephew of Lorenzo	1523
Paul III., Alessandro Farnese, native of Rome	1534
Julius III., Giovan Maria Giocci, native of Rome	1550
Marcellus II., Cardinal Cervini, native of Montepulciano	1555
Paul IV., Gianpietro Caraffa, Neapolitan	1555
Pius IV., Giovanni Angelo Medichini, native of Milan	1559
Pius V., Michele Ghislieri, native of Alessandria	1566
Gregory XIII., Hugo Buoncompagni, native of Bologna	1572
Sixtus V., Felice Peretti of Montalto, native of the March of Ancona	1585
Urban VII., Gian Battista Castagna, Genoese	1590
Gregory XIV., Nicola Sfrondati, native of Milan	1590
Innocent IX., Gian Antonio Facchinetti, native of Bologna	1591
Clement VIII., Ippolito Aldobrandini, native of Fano	1592

SEVENTEENTH CENTURY.

Leo XI., Alessandro de' Medici, native of Florence	1605
Paul V., Camillo Borghese, native of Rome	1605
Gregory XV., Alessandro Ludovici, native of Bologna	1621
Urban VIII., Maffeo Barberini, Florentine	1623
Innocent X., Gian Battista Pamfili, native of Rome	1644
Alexander VII., Fabio Chighi, native of Siena	1655
Clement IX., Giulio Rospigliosi, native of Pistoia	1667
Clement X., Emilio Altieri, native of Rome	1670
Innocent XI., Benedetto Odescalchi, native of Como	1676
Alexander VIII., Pietro Ottoboni, native of Venice	1689
Innocent XII., Antonio Pignatelli, native of Naples	1691

EIGHTEENTH CENTURY.

Clement XI., Gian Francesco Albani, native of Urbino	1700
Innocent XIII., Michael Angelo Conti, native of Rome	1721
Benedict XIII., Vincenzo Maria Orsini, native of Rome	1724
Clement XII., Lorenzo Corsini, native of Florence	1730
Benedict XIV., Prospero Lambertini, native of Bologna	1740
Clement XIII., Carlo Rezzonico, native of Venice	1758
Clement XIV., Gian Vincenzo Ganganelli, born near Rimini	1769
Pius VI., Angelo Braschi, native of Cesena	1775

NINETEENTH CENTURY.

Pius VII., Gregorio Barnaba Chiaramonti, native of Cesena	1800
Leo XII., Annibale della Genga, native of Romagna	1823
Pius VIII., Cardinal Castiglioni, native of Cingoli	1829
Gregory XVI., Mauro Cappellari, native of Belluno	1831
Pius IX., Giovanni Maria Mastai-Ferretti, native of Sinigaglia	1846
Leo XIII., Gioacchino Pecci, native of Carpineto	1878

Protestants generally object to the list of popes given by Roman Catholics, that there is no absolutely conclusive evidence of the apostle Peter's ever having been at Rome; although most of them admit the probability that he was there, and suffered martyrdom there. But they deny that there is any evidence whatever of his having exercised the office of bishop either there or anywhere else. They call in question many other of the names and dates in the earlier part of the list, not so much disputing the existence of the persons named, as their exercise of the office of bishop in Rome, and still more their right to be considered bishops *of* Rome. According to Protestants in general, the papacy grew, by a gradual assumption of power, out of an ordinary bishopric, through the advantage of metropolitan position and influence, and was afterward supported by the fable—as they deem it—of the see of St. Peter.

POPE. See RUFFE.

POPE, a co. in n.w. Arkansas, bounded on the s.w. by the Arkansas river, and drained by the Illinois bayou, Big Piney creek, and smaller streams; traversed by the Little Rock and Fort Smith railroad; 900 sq.m.; pop. '80, 14,325. The surface is hilly, and largely covered with forests; the soil is fertile. Cattle, corn, cotton, and lumber are the principal products. Coal is also found here. Co. seat, Dover.

POPE, a co. in s.e. Illinois, divided from Kentucky on the s.e. by the Ohio river; drained by Big Bay and Lusk creeks; 374 sq.m.; pop. '80, 13,259. The surface is hilly, with forests of walnut, oak, ash, hickory, cypress, and tulip trees; the soil is fertile, and corn, wool, cotton, and tobacco are raised. It contains carboniferous limestone, mineral springs, and kaolin. Co. seat, Golconda.

POPE, a co. in w. c. Minnesota, drained by the Chippewa river, a branch of the Minnesota, and traversed by the St. Paul and Pacific railroad; 720 sq.m.; pop. '80, 5,874. The surface is partly undulating, with considerable prairie land, and dotted over with a number of small lakes, some of which have no apparent outlet. The soil is fertile; principal products, wheat, oats, hay, and cattle. Co. seat, Glenwood.

POPE, ALEXANDER, an eminent English poet, was born in London, May 21, 1688. His parents were Roman Catholics, and to this faith the poet also nominally adhered, thus debarring himself from public office and employment. His father, a linen-merchant, saved a moderate competency, and received some accession of fortune by his marriage with Edith Turner, his second wife, and the poet's mother, a lady of a good Yorkshire family. He then withdrew from business, and settled on a small estate he had purchased at Binfield in Windsor forest. He died at Chiswick in 1717. His son shortly afterward took a long lease of a house and five acres of land at Twickenham, on the banks of the Thames, whither he retired with his widowed mother, to whom he was tenderly attached, and where he resided till his death, cultivating his little domain with exquisite taste and skill, and embellishing it with a grotto, temple, wilderness, and other adjuncts poetical and picturesque. In this famous villa Pope was visited by Frederick, prince of Wales, and by the most celebrated wits, statesmen, and beauties of the day, himself being the most popular and successful poet of his age. Pope's early years were spent at Binfield, within the range of the royal forest. He received some education at little Catholic schools, but was his own instructor after his twelfth year. He never was a profound or accurate scholar, but he read the Latin poets with ease and delight, and acquired some Greek, French, and Italian. He was a poet almost from infancy; he "lisped in numbers," and when a mere youth, surpassed all his contemporaries in metrical harmony and correctness. His pastorals and some translations appeared in Tonson's *Miscellany* in 1709, but were written three or four years earlier. These were followed by the *Essay on Criticism*, 1711; *Rape of the Lock* (when completed, the most graceful, airy, and imaginative of his works), 1712–14; *Windsor Forest*, 1713; *Temple of Fame*, 1715. In a collection of his works printed in 1717 he included the *Epistle of Eloisa*, and *Elegy on an Unfortunate Lady*, two poems inimitable for pathetic beauty and finished melodious versification. From 1715 till 1726 Pope was chiefly engaged on his translations of the *Iliad* and *Odyssey*, which, though wanting in true Homeric simplicity, naturalness, and grandeur, are splendid poems. They realized to the fortunate and fashionable translator a sum of about £8,000. He next edited an edition of Shakespeare, which proved unworthy of his reputation. In 1728–29, he published his greatest satire—the *Dunciad*, an attack on all poetasters and pretended wits, and on all other persons against whom the sensitive poet had conceived any enmity. In 1737 he gave to the world a volume of his *Literary Correspondence*, containing some pleasant gossip and observations, with choice passages of description; but it appears that the correspondence was manufactured for publication, not composed of actual letters addressed to the parties whose names are given, and the collection was introduced to the public by means of an elaborate stratagem on the part of the scheming poet. Between the years 1731 and 1739 he issued a series of poetical essays, moral and philosophical, with satires and imitations of Horace, all admirable for sense, wit, spirit, and brilliance. Of these delightful productions, the most celebrated is the *Essay on Man*, to which Bolingbroke is believed to have contributed the spurious philosophy and false sentiment; but its merit consists in detached passages, descriptions, and pictures. A fourth book to the *Dunciad*, containing many beautiful and striking lines, and a general revision of his works, closed the poet's literary cares and toils: he died on May 30, 1744, and was buried in the church at Twickenham. Pope was of very diminutive stature, and deformed from his birth. His physical infirmity, susceptible temperament, and incessant study rendered his life "one long disease." He was, as his friend, lord Chesterfield, said, "the most irritable of all the *genus irritabile vatum*, offended with trifles, and never forgetting or forgiving them." His literary stratagems, disguises, assertions, denials, and (we must add) misrepresentations, would fill volumes. Yet Pope, when no disturbing jealousy, vanity, or rivalry intervened, was generous and affectionate, and he had a manly, independent spirit. As a poet he was deficient in originality and creative power, and thus was inferior to his prototype, Dryden; but as a literary artist, and brilliant declaimer, satirist, and moralizer in verse, he is still unrivaled. He is the English Horace Of the many lives, that by Carruthers is one of the best (1857); the editions are innumerable.

POPE, John, b. Ill., 1823; graduated at West Point 1842, and was brevetted second lieut. of topographical engineers; served in Florida 1842–44; on the survey of the n.e. boundary line 1845–46; in the Mexican war, during which he was brevetted first-lieut. and capt. for gallantry at Monterey and Buena Vista, 1846–48; in surveys and explorations in Minnesota 1849–50; as chief topographical engineer in New Mexico 1851–53; in charge of the survey of the Pacific railroad route, near the 32d parallel of latitude, and in experiments for obtaining water on the Llano Estacado by boring artesian wells, 1853–59, during which time he was made capt. of topographical engineers in reward for services continuing through 14 years; and in light-house duty 1859–60. At the outbreak of the rebellion he was made brig.gen. of volunteers 1861, and assigned command of the district of northern Missouri; afterward commanded the army of the Mississippi, and was made maj.gen. of volunteers, Mar., 1862; was called to the e. and assigned command of the army of Virginia, with which he fought the battles of Cedar Mountain, Bull Run (second), and the skirmish at Chantilly. He was made brig.gen. in the regular army, July, 1862; and in September, at his own request, was re-assigned to the command of the department of the north-west; was made brevet maj.gen. in the regular army, Mar., 1865, and from January to June of that year commanded the military division of the Missouri. Having been mustered out of the volunteer service after the suppression of the rebellion, he was placed in command of the department of the Missouri, with his headquarters at fort Leavenworth. He is the author of *Explorations from the Red River to the Rio Grande,* contained in the *Pacific Railroad Reports,* vol. iii.; and of *The Campaign in Virginia, July and August,* 1862.

POPERINGHE, an old commercial t. of Belgium, in the province of West Flanders, four m. from the French frontier. The town is walled, and has manufactures of lace, linens, and woolen cloths. Hops are grown in the surrounding district. Pop. '70, about 11,000.

POPERY literally means attachment to the religion or to the party of the pope; and in this sense the word is synonymous with the profession of the Roman Catholic religion. In its use, however, it has come to involve the idea of contempt or disparagement. It may therefore be said that the word is either intended to designate what are regarded by Protestants as the most exaggerated and superstitious among the doctrines and practices which they ascribe to Catholics, in contradistinction to the belief of the more moderate members of that church, or is designedly employed as an expression of contempt and depreciation.

POPHAM, GEORGE, 1550–1608; b. Eng.; embarked in 1607 with two ships and 100 men for America; landing at the mouth of the Kennebec river, they built a store-house and a fortification which they called fort St. George. This was the first English settlement in New England. Popham having died the following year, the colonists, disheartened by the severity of the climate, returned in the spring to England.

POPISH PLOT, the name given to an imaginary plot, on the part of the Roman Catholics in England during the reign of Charles II., the object of which was believed to be a general massacre of the Protestants. See OATES, TITUS.

POPLAR, *Populus,* a genus of trees, forming, along with willows, the whole of the natural order *salicaceæ* or *salicineæ* (by some regarded as a suborder of *amentaceæ*), and having diœcious flowers arranged in catkins, both male and female flowers with an oblique cup-shaped perianth. The seeds have silky hairs, as in willows, and are readily wafted about by the wind. The species are numerous, chiefly natives of the temperate and cold regions of the northern hemisphere. They are large trees of rapid growth, with soft wood; and broad, heart-shaped, ovate, triangular, or lozenge-shaped, deciduous leaves, on rather long stalks. Many of them are very beautiful trees. The catkins appear long before the leaves, and proceed from distinct lateral buds. Few of the poplars are of much value for their timber, which is generally white, soft, and light; but, from their rapid growth, they are useful as yielding firewood, where the scarcity of other fuel renders it necessary to plant trees for this purpose, and they are often planted as ornamental trees, producing an immediate effect of embellishment in a bare situation more readily than almost any other kind of tree. Besides the species known by the name aspen (q.v.), or tremulous poplar, the following seem the most worthy of notice: The WHITE POPLAR, or ABELE (*P. alba*), a native of the southern parts of Europe, and reckoned among British trees, but probably not indigenous in Britain, is a tree of 80 ft. or upward; with a fine spreading head; and roundish, heart-shaped, lobed, and toothed leaves, which are smooth, shining, and dark-green above, downy and silvery-white beneath. The wood is used by cabinet-makers, turners, and toy-makers. It is little liable to swell or shrink, which adapts it for various purposes. The tree loves low situations and clay soils. This tree has of late years suffered in Britain from some unknown cause, like the potato, dying where it previously flourished; while other poplars, the most nearly allied, continue to flourish in the same localities.—The GRAY POPLAR (*P. canescens*) is very similar to the white poplar, but of more vigorous growth, a large spreading tree; the leaves similar to those of the white poplar, but not so dark-green above or so white beneath. It is not of so rapid growth as the white poplar; and its wood is harder and better, makes good flooring, and is preferable to pine-deal for the neighborhood of fire-places, being less apt to take fire; it is also used for coarse doors, carts, barrows, etc., and not being liable to warp, is esteemed by wood-carvers. The tree generally begins to rot in the heart when forty or fifty years old. Like most of the other poplars, it fills the ground round it with suckers. Like the white poplar, it is a very doubtful native of Britain, and belongs to the center and south of Europe.—The BLACK POPLAR (*P. nigra*), a native of most parts of Europe, and perhaps of England, is a tree of 50 to 80 ft. high, with an ample spreading head, viscous leaf-buds, and deltoid or unequally quadrangular, perfectly smooth leaves. The wood is used for the same purposes as that of the white and gray poplars. The "cotton" from the seeds has been used in France and Germany for making cloth hats and paper, but these uses of it were not found profitable.—The LOMBARDY POPLAR (*P. fastigiata* or *dilatata*) is perhaps a mere variety of the black poplar, with erect instead of spreading branches. It appears to have been introduced into Europe from the east. It is very common in the Punjab and in Persia, and now also in Lombardy and other parts of Italy. It attains a height of 100 or even 150 ft., and is remarkable for its erect form, contracted head, and very rapid growth. It is often planted as an ornamental tree, although not so generally as in the end of last century, when it was thought preferable for ornamental purposes to every other tree. It is common in the streets and squares of towns in all parts of Britain; and is particularly adapted to situations where a long horizontal line of any kind fatigues the eye, or as seen starting up from a mass of lower wood or shrubbery, but has a besom-like appearance when planted in unsuitable situations. The wood is of almost no value. It is generally propagated by layers.—The species commonly known as BLACK ITALIAN POPLAR (*P. monilifera* or *acladesca*), although it is really a native not of Italy, but of North America, and is sometimes more correctly called CANADIAN POPLAR, the female catkins of which resemble a string of pearls, is frequently planted both as an ornamental tree and for the sake of its timber, which is useful for flooring, etc. The leaves are deltoid. It is of very rapid growth, and attains a height of 100 to 120 feet.—The BALSAM POPLAR, or TACAMAHAC (*P. balsamifera*), a very common ornamental tree in Britain, is a native both of North America and of Siberia, and has whitish, ovate-oblong leaves, which in spring are of a delicate yellow tint, and have an agreeable fragrance. The leaf-buds are viscid. The erect fastigiate manner of growth approaches that of the Lombardy poplar. The resinous exudation of the buds (*tacamahac*) is said to be diuretic and anti-spasmodic; and an ointment made from the buds is used for tumors, wounds, and burns. The resinous exudation of the buds of other species, as the black poplar, possesses similar properties.—The COTTON-WOOD (*P. Canadensis*) of North America, particularly abundant on the upper parts of the Mississippi and Missouri, is valued as a timber tree, and has been pretty extensively planted in Britain; as has also the ONTARIO POPLAR (*P. candicans*), a species with the same balsamic character as *P. balsamifera*, and chiefly distinguished from it by its larger leaves. In size of leaf no other species equals *P. heterophylla*, a native of the southern states of North America, the leaves of which are often six inches long.

POPLIN (Fr. *papeline*). In the 15th c., a fabric was woven in Avignon called *papeline*, which was made of silk, and was much esteemed. An attempt to imitate it was introduced into England, and the name was corrupted to *poplin*, which has been adopted abroad as well as at home. In 1775 the manufacture was introduced to Ireland by French Protestant refugees, and from that time to the present, Irish poplins have been famous. What the exact nature of the original *papelines* was is not certainly known; but the best modern poplins consist of a warp of silk and a weft of worsted, which gives substance, combined with great softness and elasticity, to the material. Cotton, and even flax yarns are substituted for silk, wholly or partially, in making cheap goods; but they are very far inferior in beauty to the true poplins.

POPOCATEPETL (Aztec, *popoca*, to smoke, and *tepetl*, a mountain), or in Spanish, *Volcan Grande de Mexico* (grand volcano of Mexico), a mountain about 10 m. s.w. of the city of Mexico. It rises in the form of a cone to a height of 17,720 ft. above the sea-level, and is composed chiefly of porphyritic obsidian. Forests girdle its lower parts; but, at an elevation of 13,000 ft., all vegetation ceases. About the period of the Spanish conquest it was very active, but no eruption has been recorded since 1540. It still smokes, however. Cortez, the conqueror of Mexico, attempted to reach its summit, but was unable to do so, on account of the masses of snow that covered it. This feat was first achieved by Francisco Mantano, one of Cortez's followers, who not only climbed to the top of the mountain, but had himself let down its crater, by means of ropes, to a depth of about 450 feet. In 1827, it was again scaled by the brothers Glennie, who determined its altitude barometrically, and since then this laborious exploit has been several times performed, and even by ladies.

POPPINJAY, a name of the green woodpecker (*Picus viridis*), a bird common in most of the wooded districts of England and Scotland. See WOODPECKER.

POPPY, *Papaver*, a genus of plants of the natural order *papaveraceæ*, having a calyx of 2 (or rarely 3) sepals, which very soon fall off; a corolla of 4 (rarely 6) petals; numerous stamens seated on a receptacle; the stigma crowning the germen, without a style, and in the form of 4–20 rays; the capsule opening by pores under the persistent stigma, imperfectly divided into cells by partitions as numerous as the rays of the stigma, but which do not reach the center; the seeds extremely numerous. There are numerous species of poppy, mostly natives of Europe and Asia, some of them found even in very northern regions, but most of them in the warmer temperate parts. They are rather large herbaceous plants, annual or perennial, mostly sprinkled with bristly hairs. They have a white milky juice; a disagreeable narcotic smell, particularly when bruised; pinnatifid or bipinnatifid leaves, more rarely jagged or toothed leaves; and large showy flowers, which readily become double by cultivation. The capsules are curious, from the manner in which they fling out their seeds when the plant is shaken by the wind; each capsule being somewhat like a round or oval pepper-box, with holes, however, not in the top, where rain might get in by them, but under the rim. By far the most important species is that known as the OPIUM POPPY (*P. somniferum*), also called the WHITE POPPY, and the OIL POPPY. See OPIUM. But the same species is important on account of the bland fixed oil of the seeds, and is much cultivated as an oil-plant. *Poppy oil* is as sweet as olive oil, and is used for similar purposes. It is imported into Britain in considerable quantities from India. The poppy is also extensively cultivated for it in France, Belgium, and Germany. The use and manufacture of this oil were for a long time, during last century, strictly prohibited in France, from a mistaken notion that it must partake of the narcotic properties of the milky juice of the plant. The seed, however, contains no opium or any narcotic principle, and was well known to the ancients as a pleasant article of food, fit to be eaten by itself or with bread. The oil expressed from it is perfectly wholesome, and is much used in France and elsewhere as an article of food. Fully one-half of the oil used for cooking and otherwise for alimentary purposes in France is of this kind. The seeds yield about 40 per cent of oil, and the oil-cake is useful for manure or for feeding cattle. The oil is sometimes used by painters and by soap-boilers; but it is not good for burning. In the cultivation of the poppy for oil the seed is often sown in autumn, where the severity of the winter-frosts is not to be feared; in more northern parts it is sown in spring, and sometimes the seed is scattered on the top of the snow with which the ground is covered. Being very small, it needs little or no harrowing. Early sowing is favorable to the size of the plant, and the abundance of produce. Hoeing and thinning are advantageous. An open but rich soil is best for the poppy; and a sheltered situation is necessary, as in exposed situations, much of the seed is scattered by the wind. The poppy does not exhaust the land so much as colza, rape, and some other oil-plants. Harvesting ought to begin when one-fourth of the capsules of each plant are open. It is accomplished by pulling the plants in such a manner as not to shake the seed out of the capsules, and tying them in sheafs, which are placed together in an erect or slightly sloping position, till the ripening of the capsules is completed, when the seed is taken out by shaking the capsules into a tub or on a cloth, great care being used to prevent any earth from the roots from getting mixed with them. Some farmers in Flanders sow poppy in alternate rows with carrots. The variety of poppy chiefly cultivated as an oil-plant has flowers of a dull reddish color, large oblong capsules, and brownish seeds; but the white-flowered variety, with globular capsules and white seeds, is also used.—The ORIENTAL POPPY (*P. orientale*), a native of Armenia and the Caucasus, a perennial species, is often planted in gardens on account of its very large, fiery-red flowers. Its unripe capsules have an acrid, almost burning taste; but are eaten by the Turks, and opium is extracted from them.—Several species are British, all of them local, rare in some places, and troublesome weeds in corn-fields in other places apparently quite similar in climate. Among them is the CORN POPPY or COMMON RED POPPY (*P. rhoeas*), with bright red flowers, and deeply pinnatifid leaves. The petals are mucilaginous and slightly bitter; they have a slight narcotic smell, and a syrup made of them is sometimes used as an anodyne in catarrhs and children's complaints; but they are more valued for the rich red color which they yield. A variety with double flowers is cultivated in flower-gardens, under the name of *carnation poppy*. Among the ancients the poppy was sacred to Ceres.

POPPY-HEAD, a carved ornament, used as a finial on top of bench-ends, etc. In early examples it is a simple fleur-de-lis, but in late Gothic this and other wood-work becomes very elaborately carved.

POPULATION, as a study, comprehends those general laws that govern the increase or decrease of the human race, and the checks which modify them. The practical object of the investigation is to regulate the operation of the laws so as to promote the welfare of society. Malthus was the first to formulate the great law of the dependence of the increase of population on the means of its subsistence (see MALTHUS). The varying rate of increase in different countries makes it a subject which requires to be investigated under different heads. For those laws affecting it through the relations of births, deaths, and marriages, see VITAL STATISTICS.

PORCELAIN. See POTTERY.

PORCELAIN, RÉAUMUR'S. An opaque substance, so called after its discoverer, René Antoine Ferchault de Réaumur. It is sometimes obtained during the process of vitrification in enamel-painting. A moderate heat, long continued, produces devitrification—that is, the elements of the flux separate, and combine again in a different manner, resulting in the production of this material.

PORCH, a building forming an inclosure or protection for a doorway. Every one knows how much this beautiful feature is now used, and how efficient it is as a protection from the wind and weather. In Elizabethan and mediæval architecture, the porch was also very common in domestic architecture. In churches, it was almost universal in this country. In France many splendid porches or portals remain; they are amongst the most beautiful specimens of medieval art. In England wooden porches, of picturesque structure, are very common in the parish churches of the middle ages.

PORCUPINE. *Hystrix*, a genus of mammalia, of the order *rodentia*, and family *hystricidæ*. This family is remarkably characterized by an armature of spines, which, like those of the hedgehogs, are, as to their structure, merely thick and strong hairs. The *hystricidæ* are plantigrade; the fore-feet have 4 toes and a rudimentary thumb, the hind-feet have 5 toes. Their general aspect is heavy and pig-like, and they have a grunting voice. The muzzle is broad and blunt; the ears short and rounded; the incisors smooth and large, 2 above, and 2 below; the molars 8 above, and 8 below. The name porcupine is derived from the French words *porc*, a hog, and *epin*, a spine.—The COM-

MON PORCUPINE (*H. cristata*) is a native of the s. of Europe, of many parts of Asia, and of most parts of Africa. It is one of the largest of rodents, being from 2 to 3 ft. in length, besides the tail, which is about 6 in. long. The hinder part of the head and the neck are furnished with a crest of long bristles, capable of being elevated or depressed at pleasure. The muzzle and limbs are covered with very short hair; the back and sides with spines, which are longest on the middle of the back, where they are almost of the thickness of a goose-quill, and more than a foot long. The spines are supported by a slender pedicle, and they terminate in a sharp point; they are longitudinally striated, and are ringed with black and white, which gives a general gray color to the animal. Their ordinary position is flat, with the points directed backward; but when the animal is excited they are erected, and it rolls itself up like a hedgehog, with spines pointing in every direction. The tail spines or quills are of very singular structure, being open thin-sided tubes, about 2 in. long, supported upon slender flexible pedicles, and they make a sound by rattling together when the tail is shaken. The porcupine is said to rattle also the spines of its body when irritated, but this is doubtful. The statement has been often made, that it throws off its spines or quills by a voluntary act, launching them at its adversaries; but it has no such power, although it is possible that quills ready to come off may be detached in moments of excitement, and fly to a small distance with sufficient force to be annoying to a pursuer. The porcupine's armor, however, is strictly defensive, and it seeks to turn its back, and thus the points of its spines to an enemy. It is a solitary and nocturnal animal. It burrows in the ground, and in winter it becomes torpid. It feeds on roots, bark, fruits, and other vegetable substances, sometimes committing great depredations in gardens. The spines or quills of the porcupine are used for various purposes, and have a certain commercial value. It is chiefly sought on account of them; although its flesh is eaten, and was brought to the market of ancient Rome.—A larger species of porcupine (*H. leucurus*), with the quills of the tail quite white, is found in India, and other species inhabit different parts of the east. The ATHERURE, or TUFTED-TAILED PORCUPINE (*atherura fasciculata*), a native of India and Malacca, differs from the true porcupines in the head and muzzle not being convex, in having the quills flattened like blades of grass, and those of the tail gathered into a tuft at the end of it. The Canada porcupine, or urson (q.v.), is still more different from the true porcupines; and the coendus (*synetheres*) of the warm parts of America—which are covered with short quills, and, like the urson, live among the branches of trees—are remarkably distinguished by their long prehensile tail.

PORCUPINE ANT-EATER. See ECHIDNA, *ante.*

PORDENONÉ, a t. of Venetia, Italy, in the province of Udine, 40 m. n.n.e. of Venice, on the Noncello, a branch of the Livenza. The town is situated in a pleasant plain, near the base of the Alps. It is a station on the railway between Venice and Trieste. The site is supposed to be that of the *Portus Naonis* of the Romans. There are several large paper-mills, also cotton and linen manufactures, oil-mills, manufactures of copper goods, and glass-works. Pop. '71, 4,591.

PORGY, a species of acanthopterous fishes belonging to the genus *pagrus* and the family *sparidæ*, of which the sheep's-head (q.v.) is a member. The porgy, or *pagrus argyrops* of Cuvier, is peculiar to the Atlantic coast of the United States. This is its name in the vicinity of New York, but in the vicinity of Rhode Island it is called scup, and scuppaug, and formerly bream. In Virginia it is called fair maid. It is usually from 10 to 14 in. long, but sometimes attains a length of 18 in., weighing 4 lbs. or more. It feeds upon worms, mollusks, small crustaceans, etc. It takes the hook quite greedily, particularly if baited with clams. It is abundant in some localities, but these vary with the season. It is often very cheap in the markets, although it is an excellent fish, nearly equal to the sheep's-head.

POR'IFERA (Lat. *pore-bearing*) is the term employed by Dr. Grant to designate the class *spongiæ* or *sponges*, in consequence of the appearance which the members of this class present when a section is made through their tissue. The term *spongiæ* is used in preference by many naturalists.

PO'RISM, a kind of geometric proposition in high favor among ancient Greek mathematicians, but of which the notices that have come down to us are so few and meager that, till lately, mathematicians were not agreed about what a porism really was. The ancient works in which porisms are mentioned are the *Collectiones Mathematicæ* of Pappus, and the *Commentarii* of Proclus. Dr. Robert Simson (q.v.) was the first to restore the probably original form of porisms. As defined by Playfair, "a porism is a proposition affirming the possibility of finding such conditions as will render a certain problem indeterminate, or capable of innumerable solutions." Good examples of porisms are given in Simson's *Opera Reliqua;* Playfair's "Origin and Investigation of Porisms" (*Trans. of Roy. Soc. of Edin.* vol. iii.): Wallace's paper, "Some Geometrical Porisms, etc." (*Edin. Trans.* vol. iii. etc.).

PORK (Fr. *porc*, a hog, from Lat. *porcus*). The flesh of swine forms a very large portion of the animal food of most nations, although it is not the most nutritive, as will be seen by the following comparison of the four principal kinds of flesh-food:

	Mineral Matter.	Gelatine.	Fibrine and Alumen.	Fat.	Water.
Veal	4.5	7.5	9.0	16.5	62.5
Beef	5.0	7.0	8.0	30.0	50.0
Mutton	3.5	7.0	5.5	40.0	44.0
Pork	1.5	5.5	4.5	50.0	38.0

It has qualities, however, which especially fit it for man's use; its fatness makes it a very heat-giving food for cold and temperate climates; whilst it surpasses all other kinds of animal food in the ease with which it may be preserved by salting and drying. Hence the trade in pork is considerable in all countries where it is used, but especially so in Great Britain and America, where vast quantities are cured for the supply of ships and the army, and for home use. The quantity of pork imported into Britain (of which the greater part comes from the United States) is prodigious; in 1875 the value of the bacon and hams imported amounted to £6,955,200, besides pork to the value of £594,386. Millions of hogs are raised in the state of Ohio, and the curing of swine's flesh is the staple business of Cincinnati and other towns. A more vivid idea of the extent of this vast trade cannot be given than a recent statement of the *Louisville Gazette*, that "there were between 5 and 6 acres of barreled pork piled up 3 tiers high, in open lots, and not less than 6 acres unpiled, which would cover 18 acres if closely laid in a single tier on the ground; besides all which, 6 acres of pens were filled with hogs waiting to be killed." America has long furnished the chief supply of mess and common pork not only for the British army, navy, and mercantile marine, but also for those of most European nations. Next to America, Ireland, and especially the neighborhood of Cork, furnishes the largest supply of cured pork; and London and Wiltshire, and other parts of England, also furnish vast quantities of bacon and hams for general consumption.

POROS'ITY. By this term we express the experimental fact that no kind of matter completely fills the space it occupies: in other words, that all bodies are full of minute cavities or interstices, such as are illustrated on a large scale by a sponge. On the atomic theory, it is obvious that this must be the case if the atoms of matter are spherical, or, indeed, if they have any form save one or two special ones, such as cubes or rhombic dodecahedrons. It is commonly asserted that all bodies must be porous, because they are compressible; but this is a great mistake, since we have no reason to believe that matter is not *per se* compressible, independently of the existence of interstices. The Florentine academicians, in their attempts to compress water, proved the porosity of silver by flattening a sphere of that metal, filled with water, and soldered. The water escaped through the pores of the silver, and stood in fine drops on its surface. The porosity of liquids is easily shown by mixing alcohol and water. The bulk of the mixture is considerably less than the sum of the bulks of the components, showing that these must in part have entered each other's pores. This property of matter is of great importance in natural phenomena, as it brings the molecular forces of capillarity into play—raising the sap in vegetables, allowing rain to sink into the ground, etc.

PORPHYR'IUS, one of that series of ancient philosophers to whom is due the reformation of the Greek philosophy known as Neoplatonism, was probably b. at Batanea in Syria (the Bashan of Scripture) in the year 233 A.D. His original name was Malchus, the Greek form of the Syro-Phenician *Melech*, or king. The name by which he is known in history, *Porphyrius*, "one clad in purple," is but a Greek epithet intended as a sort of paraphrase of his name. He is said by Socrates the historian, and by St. Augustine, to have been originally a Christian; but this seems improbable, although it is certain that in his youth he was a hearer of Origen, or at least held some intercourse with him at Cæsarea in Palestine. What is more certain is that he passed at a later time to Athens, where he studied rhetoric under Longinus, the well-known author of the treatise *On the Sublime*. It was at Rome, however, whither he repaired soon after 260, that he entered upon what must be regarded as, historically considered, the career of his life. Here he became a scholar of the Neoplatonist Plotinus, with whom, as well as with another member of the same school, named Amelius, Porphyrius entered into an animated controversy, but eventually adopted so fully the opinions of Plotinus that he became himself, if not the leader of the school, at least the most trusted of the disciples of its master. After 6 years' residence in Rome, he went to Sicily, where, if St. Jerome's account is to be relied on, he wrote his once celebrated treatise in 15 books against the Christians, now known only from the replies which it elicited, having been burned by order of the emperor Theodosius. From Sicily he went to Carthage, and afterward to Athens; but eventually, Plotinus having died soon after Porphyrius left Rome, he returned to that city, where he continued to teach, as it would seem, until his death, which was probably about 305 or 306. For a view of Porphyrius's position in the history of the Neoplatonic school see NEOPLATONISTS. Porphyrius was a very voluminous writer. Of his works the titles of more than 60 are still preserved, 43 of which are entirely lost. His *Life of Pythagoras;* his work *On Abstinence from Animal Food;* his *Commentary on Aristotle's Categories*, with the *Introduction;* and *On the Harmonies* of Ptolemy; and the book *Ad Marcellam*, addressed to his wife, are preserved entire. The rest are known chiefly by fragments, nor has any complete edition of his works been published.

PORPHYRY (Gr. purple), a term originally confined to an Egyptian rock used in sculpture, and known now as Rosso antico. It is composed, according to Delesse, of a red feldspathic base, in which are disseminated rose-colored crystals of the feldspar called oligoclase, with some plates of blackish hornblende, and grains of oxidized iron ore. The term is not now, however, used to denote any particular rock, but is applied to any rock which, like the Rosso antico, has a homogeneous earthy or compact base, through which are scattered distinct crystals of one or more minerals of contemporary origin with the base. Thus gray volcanic trachyte often abounds in crystals of glassy feldspar, forming a trachytic porphyry: or crystals of feldspar, quartz, or calcareous spar, disseminated through a base of greenstone, form a greenstone porphyry. In the same way, there are pitchstone porphyry, basaltic porphyry, claystone porphyry, etc.

PORPOISE, or PORPESSE, *Phocæna*, a genus of cetacea, of the family *delphinidæ*, having a form similar to the dolphins, but the muzzle short, uniformly convex, and without a beak; a dorsal fin; the teeth very numerous, simple, and equal. The COMMON PORPOISE (*P. communis*) is the most plentiful of the cetacea on the British coasts, abounding particularly on the western coasts of Ireland and of Scotland. It is found also on all the coasts of Europe from the Mediterranean northward, on the coasts of North America, and in the Arctic regions. It is one of the smallest of the cetacea, its length sometimes not exceeding 4 ft., although individuals occur of 6 or even 8 ft. in length. The body is spindle-shaped; its greatest diameter is near the dorsal fin. The skin is perfectly smooth and destitute of hair. There are from 40 to 50 teeth in each jaw, not conical, as in most of the cetacea, but compressed. The eye is rather small, and the pupil in the form of a V. The opening of the ear is very minute, like a hole made with a pin. The blow-hole is crescent-shaped, with the horns of the crescent directed forward, and is situated exactly over the eyes.

The porpoise is gregarious, and large numbers are often seen together, sometimes swimming in file, when their backs, appearing above the surface of the water, are apt to suggest the idea of a great sea-serpent; sometimes gamboling, either in fine weather or when a storm is approaching, or even in the midst of a storm. The porpoise feeds on fish, which its teeth are admirably adapted to catch; and herds of porpoises pursue the vast shoals of herring, mackerel, etc., into bays and estuaries. The porpoise sometimes ascends rivers, apparently in pursuit of salmon, as far as the water is brackish, and is not unfrequently itself caught on such occasions. It is an object of pursuit on account of its skin, its oil, and its flesh. The skin is nearly an inch thick, but is planed down until it becomes translucent, and is made into excellent leather, which is used for covering carriages and for other purposes. Little use is made of it in Britain, but it is used in America. Under the skin is a layer of fat, about an inch in depth, which yields oil of the finest quality. The flesh is dark-colored and bloody, but was in former times highly esteemed, and reckoned fit for the table of royalty, perhaps partly because among Roman Catholics it was accounted *fish*. In the time of queen Elizabeth it was still used by the nobles of England, and was served up with bread-crumbs and vinegar. It is now used only in very northern regions. It is a chief dainty of the Greenlanders.—The grampus (q.v.) is commonly referred to this genus.—Another species of porpoise (*P. capensis*) is found near the cape of Good Hope.—The name porpoise is from the French *porc-poisson*, or the Italian *porco-pesce* (hog-fish, corresponding to the French *marsouin* (sea-hog), and the German *meerschwein*.

POR'PORA, NICOLO, 1686–1767; b. Naples; studied music under Scarlatti. His musical talent was first recognized in Vienna, where he received the notice and approbation of the emperor Charles VI. He was very successful in Venice in 1726, and a year later became director of the theater in Dresden. He established a vocal school in Naples in 1731, and Farinelli and Cassarelli were among his pupils. In 1733 he went to London to conduct an opera, as a rival of Handel, where, although well supported, he was not considered successful. In 1746 he was in Vienna, and was Hadyn's teacher at that time; and in 1750 he was director of the Incurabili conservatory in Venice. He composed a number of operas, masses, cantatas, and sonatas, which are little known now. He died poor in Naples.

PORRI'GO. See FAVUS and RINGWORM.

PORSENNA, also PORSENA, LARS or LARTH (*Lar*, in Etruscan, means "lord" or "prince"), in the early and uncertain history of Rome, appears as a powerful king of Clusium in Etruria. According to the legend told by Livy for history, when Tarquin the proud was expelled from Rome, he sought the help, first of the Veii and the Tarquinii (his Etruscan kinsmen), against his revolted subjects; but their efforts not proving successful, he turned to Porsenna, who willingly espoused his cause, and marched a great army against Rome. The Etruscan king seized the Janiculum, a fortified hill on the w. side of the Tiber; and would have forced his way into the city across the "Bridge of Wooden Piles" (*pons sublicius*), had not a brave Roman, Horatius Cocles, kept the whole of Porsenna's army at bay, while his comrades behind him hewed down the bridge; after which he plunged into the Tiber, and safely swam across its waves. Porsenna, we are informed, now laid siege to Rome; and after a while, the inhabitants began to suffer so severely from famine, that a desperate expedient was had recourse to. Three hundred of the noblest Roman youths swore to peril their lives in cutting off the Etruscan king. The first on whom the lot fell was C. Mucius, who stole into the camp of Porsenna, but not knowing the person of the king, killed his secretary instead. He was instantly seized, and put to the torture; but the unshrinking audacity with which he thrust his right hand into the fire and let it burn, moved the king so much, that he pardoned him; whereupon Mucius (ever afterward called *Scævola,* "the left-handed") told him of the jeopardy in which he was placed. Porsenna resolved to make peace with Rome at once, and his conditions, which were pretty favorable, being accepted by the sorely-pressed citizens, he withdrew his forces. This version of the story is wholly discredited by modern criticism, and is believed to have been invented by the patriotic annalists of ancient Rome to conceal the fact of a temporary Etruscan conquest, and the evidence in favor of this view is overwhelming. Tacitus even expressly affirms that Porsenna conquered the city; Dionysius informs us that the senate sent him an ivory scepter, a golden crown, and a triumphal robe, which was the form that had been adopted by the Etruscan cities themselves of acknowledging the supremacy of the Roman king, Tarquinius Priscus; and Pliny mentions a circumstance which is quite conclusive as a proof of the subjugation of Rome—viz., that Porsenna forbade the citizens to use iron, except for agricultural purposes. Niebuhr, who has placed this view beyond all doubt, notices various minor incidents which are perfectly unintelligible, except on the hypothesis of an Etruscan conquest. The whole details of the ancient legend, therefore, may be regarded as fabulous—the product of patriotic unveracity—and what seems most reasonable to believe, is, that a great rising of the Etruscan against the Latin races took place, and that Rome, forming the Latin frontier toward Etruria, was exposed to the first brunt of the war, and suffered a disastrous defeat; but that shortly after, the Etruscans themselves were decisively beaten, and forced back into their own territories; for after the conquest of Rome, Aruns, a son of Porsenna, proceeded against Aricia, where (according to Livy) his army was routed under the walls of that city by the combined forces of the Latin cities, with the help of Greek auxiliaries from Cumæ. It is worth while quoting, as a proof of Niebuhr's wonderful talent for felicitous conjecture, that he explains the long surviving Roman custom of beginning an auction by offering for sale the goods of king Porsenna, by the supposition that in the recovery of their independence, the Romans probably captured property belonging to their late master, which they may have publicly sold. The sepulcher of Porsenna at Clusium is described by Varro, but his description is not credible. The ancient legend has been magnificently rendered in modern verse by Macaulay. See the *Lays of Ancient Rome.*

PORSON, Richard, the greatest Greek scholar England has ever produced, was b. on Christmas, 1759, at East Ruston, Norfolk, where his father was parish clerk. The curate of the parish conceiving a liking for the boy, on account of his omnivorous appetite for books and his marvelous memory, took charge of him, and had him educated along with his own sons. Porson afterward found a patron in Mr. Norris (the founder of the Norrisian professorship at Cambridge), who sent him to Eton in 1774, where he remained four years, but did not acquire any of the ordinary distinctions, although it is evident that it was there his mind acquired a fixed bias toward classical studies. Another patron, sir George Baker, sent him, in 1778, to Trinity college, Cambridge, of which he was elected a scholar in 1780. Next year he won the Craven scholarship, and subsequently, the first chancellor's medal. In 1782 he was chosen a fellow of Trinity. It was about this time that he began to give indications of his subtle sagacity and taste in the difficult verbal criticism of the Greek dramatists. For four years he contributed to Maty's *Review* —his first critique being on Schulz's Æschylus, and his finest on Brunck's Aristophanes. He also opened a correspondence with professor Ruhnken. If, however, we are to judge from a quatrain written at a later period of his life, he did more than correspond:

> I went to Strasburg, where I got drunk
> With that most learned professor Brunck;
> I went to Wortz, and got more drunken
> With that more learned professor Ruhnken.

In 1787 appeared, in the *Gentleman's Magazine,* his sarcastic letters on Hawkins's *Life of Johnson.* For the same periodical he also wrote his far more famous and trenchant *Letters to Travis on the Three Witnesses.* The dispute concerned the genuineness of John i. 7, 8, and was occasioned by a blundering and pretentious defense of the passage by archdeacon Travis, against the scornful attack of Gibbon. Porson naturally incurred great odium on account of the side he took in this controversy. One old lady who had him in her will for a legacy of £300, cut it down to £30, when she heard that he had written a book against Christianity. In 1792 he resigned his fellowship, as he found that he could not conscientiously take orders in the church. Some of his friends now raised a fund to preserve him from want, and about £100 a year was secured. He was also appointed to the regius professorship of Greek in the university of Cambridge—an office, indeed, only worth £40 a year; yet so splendid was his learning, so admirable his taste, so vigorous and epigrammatic his style of criticism, that he might easily have—by the exercise of a moderate degree of continuous literary labor—succeeded in gaining a handsome income.

But already "two devils had him in their gripe"—procrastination and a raging thirst for drink—and they held him firm to the end of his melancholy career. The only thing he ever did in connection with his Greek professorship was to deliver a *prælectio* so excellent, that, it has been said, if he had passed from verbal to æsthetic criticism he would have surpassed all his countrymen in that too. In 1794 he edited the plays of Æschylus for the Foulis press, Glasgow; and between 1797 and 1801, four of Euripides, the *Hecuba*, the *Orestes*, the *Phœnissæ*, and the *Medea*. He also collated the Harleian MS. of the *Odyssey* for the *Grenville Homer*. In 1806 he was appointed librarian of the "London institution" with a salary of £200; but was so grossly negligent of his duties that the directors officially notified their dissatisfaction in these emphatic words: "We only know that you are our librarian by seeing your name attached to the receipts for your salary." He died of apoplexy, Sept. 25, 1808, in the 49th year of his age, and was buried with great pomp in the chapel of Trinity college, Cambridge. Porson's rage for drink was fearful. He would pour anything down his throat rather than endure the "terrible torture of thirst." Ink, spirits of wine for the lamp, an embrocation, are among the horrible things he is reported to have swallowed in his extremity. "He used to return to the dining-room after the company had left it; pour into a tumbler the drops remaining in the wine glasses, and drink off the collectanea." In fact, his thirst was so outrageous, that Porson cannot be considered a mere willful drunkard; one must believe that he was driven into his excesses by some unknown disease of his constitution. See POLYDIPSIA. Porson's memory was as amazing as his thirst. The anecdotes told by his biographers almost surpass belief, yet are thoroughly authenticated. His critical acumen has never been matched in England. His tracts, reviews, letters, etc., were collected and edited, with a biographical notice, by Kidd, in six volumes. See "Porsoniana" in Rogers's *Table-Talk*, and the rev. J. Selby Watson's *Life of Richard Porson, M.A.* (1861).

PORT, in naval language, has at least three significations; first, a port is a harbor where ships are admitted to embark or discharge cargoes, or for other purposes—a free port being one in which the embarkation and discharge can be conducted without the payment of customs or port dues. A port in a ship's side is the aperture for admitting light and air, or for pointing a gun through. See PORT-HOLE. Port is also the official name for the left-hand side, when looking toward the bow of a ship—i.e., looking forward. The term was, a few years ago, arbitrarily substituted for larboard (q.v.).

PORTA, GIAMBATTISTA DELLA, 1540–1615; b. Naples; spent much time traveling in Spain, France, Italy, and other parts of Europe, assisting many schools and academies by his knowledge and wealth. An association of men called "I Segreti," met at his house, only those who had discovered some principle or fact in natural science being admitted as members. This society made certain predictions, which were fulfilled, and hence was accused of magic. The news of this reaching the pope, Porta was compelled to dissolve the society. He was sought by many because of his supposed secret power, and ability to read the future. He benefited the world by his investigations in optics, the camera obscura and several other instruments having been invented by him. Among his writings were dramas which were not successful, but he produced works on human physiognomy, magic, geometry, chemistry, meteorology, optics, and landscape gardening many of which were much sought. *De Humana Physiognomia*, his principal work, was published in Sorrento, 1586, followed two years later by his translation into Italian, published in Naples.

PORTADOWN (Ir. *Port-na-Doon*, Port of the Fort), a market and manufacturing t. of the co. of Armagh, Ulster, Ireland, on the Bann, 11 m. n.e. of Armagh by railway. It was formerly the seat of the M'Canns, a clan tributary to the O'Neil, and formed part of territory "settled" by James I., and afterward by Charles I. It is a place of considerable trade in corn, flax, and other agricultural produce, and is the seat of an extensive manufacture of linen yarns and linen. Communicating by canal with the sea at Newry, and by railway with Belfast, it has also a considerable import trade. The pop. in 1871 was 6,735, of whom 3,147 were Protestant Episcopalians, 1982 Roman Catholics, 857 Presbyterians, 715 Methodists, and the rest Protestants of other denominations. Portadown is connected by the Ulster railway with Armagh, Dungannon, and with the several n.w. counties.

PORTAELS, JEAN FRANÇOIS, b. Belgium, 1820; studied painting in the academy of Brussels, and in Paris under Paul Delaroche, and then spent ten years traveling in Italy, Egypt, and the east. In 1847 he was appointed director of the academy of Ghent, and in 1851 was knighted. Among his best-known works are "The Story-teller of Cairo," "A Funeral in the Desert of Suez," "A Caravan in Syria Overtaken by a Simoon," "Fatima," "Rebecca," "Ruth," "The Suicide of Judas," and a portrait of Mehemet Ali, his patron. At an exhibition of paintings in Sydenham palace in 1873, he received a special gold medal for the finest picture, "A Drought in Egypt."

PORTAGE, a co. in n.e. Ohio; drained by the Cuyahoga and Mahoning rivers; intersected by the Cleveland and Pittsburg, and Atlantic and Great Western railroads; 500 sq.m.; pop. '80, 27,500—24,794 of American birth. The surface is level, and the soil produces in large quantities corn, flax, oats, and hay. Butter, cheese, and maple sugar are made. Bituminous coal is found. Co. seat, Ravenna.

PORTAGE, a co. in w.c. Wis., intersected by the Green Bay and Minnesota, and the Wisconsin Central railroads, and drained by the Wisconsin, Plover, and Waupaca rivers, and Mill creek; 792 sq.m.; pop. '80, 17,731. The surface is hilly and largely covered with pine trees; the soil is fertile; cattle, grain, wool, and hops are the principal products. It contains 22 saw-mills, and lumbering is extensively carried on. Co. seat, Stevens Point.

PORTAGE, a city and seat of justice of Columbia co., Wis., on the Wisconsin river at the head of navigation, and on a canal which connects the Wisconsin and Fox rivers, and renders the waters navigable from Green bay into the Mississippi. It is on the Wisconsin Central, and the Milwaukee and St. Paul railroads, 32 m. n. of Madison; pop. '80, 4,446. It has water-power from the canal, and has boot and shoe factories, flour-mills, tanneries, breweries, and the machine and repair shops of the railroads. It contains a court-house, jail, schools, and banks, and has a large trade from the surrounding country.

PORTAL, the recess of a large doorway, such as the entrance to a church. See PORCH.

PORTALIS, JEAN ÉTIENNE MARIE, 1746-1807; b. in Beausset, Provence, France. At the age of 21 he was admitted as an advocate by the parliament of Aix. He became widely known by his memorial *On the Validity of Protestant Marriages in France*, and by his prosecution of the cases against Mirabeau and Beaumarchais. At the outbreak of the revolution he fled to Lyons; but in 1793 went to Paris, where he was imprisoned, obtaining his liberty after the fall of Robespierre. In 1795 he was a member of the council of the ancients, where he advocated humane measures in opposition to the directory. In 1797 he was proscribed, and fled to Germany, but in 1800 returned. In 1801 he became councilor of state, in 1803 a senator, and in 1804 minister of the interior and public worship. He was the author of *Traité sur l'Usage et l'Abus de l'Esprit Philosophique pendant le xviii. Siècle.* He was a member of the French academy.

PORTAMENTO (Ital. *portare*, to carry), a musical term used for the sustaining of the voice, and passing from one note to another.

PORTARLINGTON, a market t. and parliamentary borough, partly in the King's county, partly in the Queen's county, Leinster, Ireland, on the Barrow, 44 m. w.s.w. from Dublin, with which it communicates by the Great Southern and Western railway. Pop. in '71, 2,424, of whom 1688 were Roman Catholics, 673 Protestant Episcopalians, and 58 Methodists. Portarlington was anciently called Cooltetoodra; but being granted by Charles II. to the earl of Arlington, was called by his name. By him it was sold to sir Patrick Traul; and on the attainder of sir Patrick, was granted by William III. to gen. de Rouvigny, who planted in it a colony of French and Flemish Protestants, many of whose descendants still remain. It is now the property of the family of Dawson, earls of Portarlington. It returns one member to parliament. The town is well built, and provided with two national, two endowed, and also private schools of considerable reputation, at one of which the late duke of Wellington and his brother lord Wellesley received part of their education. The ratable value of property is £4,389.

PORT ARMS, in musketry drill, is derived from *portare*, to carry, and applies to a motion in which the fire-arm is brought to a slanting position in front of the body, lock to the front, the barrel crossing opposite the front of the left shoulder.

PORT-AU-PRINCE, or PORT-REPUBLICAN, the capital of Hayti (q.v.), is situated on the w. coast, at the head of a bay of the same name, and has a fine appearance from the sea, but the interior is filthy in the extreme. The houses are chiefly of wood, and dungsteads obtrude everywhere, even in the thoroughfares. The most notable buildings are the palace and the senate-house; other public edifices are the churches, a lyceum, college, custom-house, mint, and hospital. Port-au-Prince carries on a trade in mahogany, logwood, honey, coffee, cocoa, and rags. Pop. about 21,000. The town has suffered frequently from earthquakes.

PORT CHESTER, a v. in Westchester co., N. Y.; 25 m. from N. Y. city; on the New York, New Haven and Hartford railroad; pop. '70, 3,797. The place was incorporated in 1868. It is pleasantly situated, and the residence of many business men of the city. There is a weekly paper, two banks, an iron foundry, and several factories and mills. There is navigation to its wharves, for small vessels, on Byram river emptying into the sound.

PORTCULLIS (Fr. *porte*, gate, and *coulisse*, from *couler*, to flow), a frame of wood strengthened with iron in the form of a grating, and sliding in vertical grooves in the jambs of the entrance gate of a fortified place, in order to defend the gate in case of assault. The vertical bars were pointed with iron below, and struck on the ground when the grating was dropped, so as to injure whatever it fell upon. In heraldry, the portcullis is represented with rings at its uppermost angles, from which chains depend on either side. It was a badge of the Beaufort family, and borne in virtue of their Beaufort descent by the Tudor sovereigns. Portcullis is the title of a pursuivant in the English college of arms, whose office was instituted by Henry VII.

PORT D'URBAN, or PORT NATAL, the only sea-port of the colony of Natal (q.v.).

PORTE, sublime porte, or ottoman porte, the name given to the Turkish government. The origin of this name is to be referred to the ancient oriental custom of making the gates of cities and of king's palaces places of assembly in connection with the affairs of government and of the administration of justice. In the Byzantine empire this custom was adopted, and the term was transferred from the high gate of the imperial palace to the government whose authority was there exercised. The Turks found the term in common use among the Byzantines some time previous to their establishment at Constantinople, and adopted it on the organization of their empire. The use, among European nations, of the French term *sublime porte* ("lofty gate") is accounted for by the fact that French is the language of European diplomacy.

PORT ELIZABETH, an important sea-port of s. Africa, commercial capital of the eastern province of the British colony of the cape of Good Hope, stands on the western shore of Algoa bay (q.v.), in lat. about 34° s., long. 25° 25' east. Many of the streets are elegant. One range of houses, consisting of four streets, which will bear comparison with the best streets in England, forms a continuous line 2 m. in length. In the style of its buildings, this town is superior to any other in s. Africa. Its magnificent warehouses are constructed on a palatial scale, and resemble the finest in London, and its public buildings are all solid and substantial edifices. The principal are the town-house, 90 ft. square and three stories high, containing the public library, the Athenæum, and the municipal chambers; the public hospital, furnished with 100 beds; the Presbyterian and other churches, and the Roman Catholic cathedral. Its educational institutions are of a superior description. In 1854, under the auspices of governor sir George Grey, a system of schools was introduced known as the Grey institute schools, founded on a magnificent grant of town-lands, lately yielding a revenue of over £1000 per annum, and which affords a very excellent education at a very moderate charge. The chief of these are a high-school or college, and three elementary or district training-school.

The town was founded in 1820, and the census of 1865 showed the population of the municipality of Port Elizabeth to be 8,700; in 1875 it was close on 13,000. Port Elizabeth has made more rapid advancement than any other town in the colony; and the inhabitants are particularly notable for their enterprise and business energy. It owes its commercial importance in great part to the circumstance of its being the emporium of the great wool trade of the colony; and besides this it carries on a rapidly-increasing home and foreign trade. The transactions of its four banks are extensive. Two lines of railway run inland from Port Elizabeth. The imports are valued at near £1,500,000 a year, and the exports about £2,000,000. As much as thirty or forty millions of pounds of wool may be exported in one year. The other colonial exports fall mainly under the heads of skins, hides, horns, ivory, and feathers.

The shore is open to the swell of the Indian ocean, which often rolls in upon the beach with such violence that, until recently, cargoes could only be got to land by the use of surf-boats. Kaffirs, tempted by the high pay offered, used to come from a great distance to do the difficult and dangerous work of unloading the boats. But this system of landing is now in great measure done away with, and ships now unload at several jetties. A break-water has been constructed, and there are three lights for the direction of vessels.

PORTER, a kind of malt liquor which came into use in London in 1722. According to Leigh, "the malt liquors previously in use were ale, beer, and twopenny, and it was customary to call for a pint or tankard of half-and-half—i.e., half of ale and half of beer, half of ale and half of twopenny, or half of beer and half of twopenny. In the course of time it also became the practice to ask for a pint or tankard of three-thirds [or, as it became corrupted, *three threads*], meaning a third each of ale, beer, and twopenny; and thus the publican was obliged to go to three casks for a single pint of liquor. To avoid this trouble and waste, a brewer of the name of Harwood conceived the idea of making a liquor which should partake of the united flavors of ale, beer, and twopenny. He did so, and succeeded, calling it entire, or entire butt beer, meaning that it was drawn entirely from one cask or butt; and being a hearty nourishing liquor, it was very suitable for porters and other working people. Hence it obtained the name of porter, and was first retailed at the Blue Last, Curtain Road, Shoreditch." The chief characteristics of porter are its dark-brown color, peculiar bitter flavor, and agreeable freshness in drinking. Until within the last twenty years it was generally brewed with malt roasted until slightly brown; now, however, under the improved system of brewing, pale malt, with the addition of some highly roasted, for the sake of color only, is used. Enormous quantities are brewed by the London brewers. A kind much stronger than ordinary porter is also extensively brewed in London, Dublin, and elsewhere, under the name of *stout*. The name porter is now seldom used in England, beer being the general designation.

PORTER, a co. in n.w. Indiana, bounded by lake Michigan on the n., and drained by the Calumet and Kankakee rivers, the latter its s. limit; intersected by the Baltimore and Ohio, the Fort Wayne and Chicago, the Chicago and Lake Huron, and the Lake Shore and Michigan railroads; 420 sq.m.; pop. '80, 17,229—13,353 of American birth. The surface is a rolling prairie and produces corn, hay, wheat, and oats. Co. seat, Valparaiso.

PORTER, ANDREW, 1743–1813; b. Penn.; before the revolution was a school-teacher, but in 1776 was made a capt. of marines and served on the *Effingham*. He afterward joined the artillery, was noted as a scientific gunner, and was engaged in the battles of Trenton, Princeton, Brandywine, and Germantown, receiving the personal commendation of Washington on the field of battle. He was made maj. in 1782 and later col. In 1779 he was with Sullivan's expedition against the Indians; subsequently held high offices in the state militia, but declined to accept the rank of brig.gen. and office of secretary of war, tendered him by president Madison at the outbreak of the war of 1812.

PORTER, David, 1780–1843; b. Boston; entered the navy as midshipman in 1798, served on board the *Constellation* in the fight with the *Insurgente* in 1799, and was made a lieut. for his gallant conduct. He held two or three commands in the Tripoli troubles; was twice wounded, and in 1803 made prisoner and detained for 18 months. In 1806, while in command of the *Enterprise*, he defeated 12 Spanish gunboats which attacked him near Gibraltar. At the beginning of the war of 1812 he was made a capt. and assigned to the *Essex*, a frigate of 32 guns. He took the *Alert*, the first ship-of-war captured in the war; the *Nocton*, having a large amount of gold on board; and many trading vessels. In 1814, while lying in Valparaiso, a neutral port, the *Essex* was attacked by two frigates, the *Phœbe* and *Cherub*, carrying in all 64 guns, and defeated, after a heroic resistance, with a loss of 58 killed, 66 wounded, and 31 missing. In 1815 he was one of the navy commissioners and held the office until 1823, when he was sent to the gulf of Mexico to suppress piracy. Indignant at insults to the American flag at Porto Rico, he demanded an apology and by threats of force obtained one from the authorities. For this he was recalled, court-martialed, and sentenced to suspension for 6 months. In 1826 he resigned, and for a short time was connected with the Mexican navy, but in 1829 became U. S. consul at Algiers. From 1831 to 1843 he held diplomatic positions at Constantinople, and negotiated treaties of importance. He wrote *Constantinople and its Environs* (1835).

PORTER, David D., Admiral of the American navy, son of commodore David Porter, who commanded the *Essex* frigate in the war of 1812, b. Philadelphia about 1805, entered the navy as midshipman in 1829, serving under commodores Biddle and Pattison, passed his examination in 1835, was employed from 1836 to 1841 in the survey of the coast of the United States: in 1841 appointed as lieut. to the frigate *Congress*, and employed 4 years on the Mediterranean and Brazil stations: in 1845 transferred to the national observatory at Washington, and during the Mexican war, to the naval rendezvous at New Orleans; again to the coast-survey, and from 1849 to 1853 engaged in command of the California mail-steamers. At the commencement of the war of 1861 he was appointed, with the rank of commander, to the steam sloop-of-war *Powhatan*, and ordered to Pensacola; distinguished himself in the capture of New Orleans, and commanded the gunboat and mortar flotilla which co-operated with the squadron of admiral Farragut in the first attack upon Vicksburg. In 1863 he aided in the second and successful bombardment, and subsequently commanded the naval forces in James river, and in the attacks upon fort Fisher, captured at the second attack. At the termination of the war, he was appointed superintendent and president *ex officio* of the U. S. naval academy, Annapolis. He was made vice-admiral in 1866, and in 1870 he became admiral, a rank which carries with it the command of the whole U. S. navy, subject only to the president.

PORTER, Ebenezer, d.d., 1772–1834; b. Conn.; graduated at Dartmouth college in 1792; studied theology at Bethlehem, Conn.; became in 1796 pastor of the Congregational church at Washington, Conn.; in 1812 professor of sacred rhetoric in Andover theological seminary, and in 1827 its president, retaining the positions until his death. He published *Young Preacher's Manual; Analysis of Vocal Inflections; Analysis of the Principles of Rhetorical Delivery; Rhetorical Reader and Exercises; Lectures on Homiletics and Preaching, and on Public Prayer, with Sermons and Addresses;* since his death *The Biblical Reader* and *Lectures on Eloquence and Style* have been published. Dr. Porter was a contributor to the *Quarterly Register*, and a translator of many sacred German poems.

PORTER, Fitz John, b. N. H., 1822; graduated at the U. S. military academy, West Point, 1845, when he entered the army as brevet second lieut. of artillery. He was engaged in the war with Mexico from the beginning; was wounded in the attack on the city of Mexico, Sept. 13, 1847; and was promoted to brevet capt. and maj. for distinguished gallantry in the battle of Molino del Rey and the storming of Chapultepec. After the war he was sent to West Point, where he was adj. of the post, and acted as instructor of artillery and cavalry. In 1856 he was transferred to the adj.gen.'s department, and was assistant adj.gen. of the Utah expedition under Albert Sidney Johnston in 1857. On May 14, 1861, he received the appointment of col. of the 15th infantry; was made brig.gen. of volunteers on the 17th; and served as chief of staff with gen. Banks and gen. Patterson, until August, when he was put in command of a division in the army of the Potomac. He had charge of the siege operations against Yorktown during the campaign on the peninsula, and was then given the command of the 5th army corps, which fought the battles of Mechanicsville and Gaines's Mill, and bore the brunt of the fight at Malvern hill. During a part of the second battle of Bull Run this corps was heavily engaged, and was badly cut up; it was also in the fight at

Antietam. In Nov., 1862, gen. Porter was tried by court-martial for alleged disobedience of the orders of gen. John Pope, at Manassas, on Aug. 28–29, 1862; and on Aug. 21, 1863, was cashiered and disqualified from holding any position under the U. S. government. In June, 1878, a board of officers was convened at West Point, by order of the president of the United States, to examine the evidence and to consider the findings of the court-martial in the case of gen. Porter, and to report to the secretary of war what action, in their judgment, justice required should be taken by the president in reference to that case. This board, after a full examination of the case, including evidence before inaccessible, and other evidence before misunderstood, reported that, in the opinion of those forming it, justice required at the hands of the president of the United States "such action as may be necessary to annul and set aside the findings and sentence of the court-martial in the case of maj.gen. Fitz John Porter, and to restore him to the position of which that sentence deprived him—such restoration to take effect from the date of his dismissal from office." This report was signed by the entire board, including maj.gen. J. M. Schofield, brig.gen. Alfred H. Terry, and brevet maj.gen. Geo. W. Setty. The report was laid before the house committee on military affairs, and a majority of this committee, in Jan., 1881, reported a bill restoring him to his rank of maj.gen. in the U. S. army; and requiring the secretary of the treasury to pay to gen. Porter the sum of $75,000, "as a measure of award in acknowledgment of the wrong done to and suffered by him through his dismissal from the army and deprivation from the rights of citizenship, upon charges now established to be unfounded." At the present time(April, 1881) congress has not completed its action in regard to this case.

PORTER, Horace, b. Penn., 1837; educated at West Point, and appointed to the ordnance department of the army in 1860. He was assistant ordnance officer on the Port Royal expedition in 1861, participated in the siege of fort Pulaski, Georgia, and the James island expedition. He was chief of ordnance of the army of the Potomac, 1862, and of the army of the Cumberland, 1863, and aid-de-camp to gen. Grant, 1864–65. He was military sec. to gen. Grant, 1869–73.

PORTER, Jane, 1776–1850; b. England; educated at Edinburgh; lived with her mother and sister till their death. Her first work, *Thaddeus of Warsaw*, appeared in 1803, was extremely popular, and secured her a complimentary letter from Kosciusko, and election into the Teutonic order of St. Joachim as canoness. In 1809 she published *Scottish Chiefs*, a romance of the times of Bruce and Wallace. Like her former work, it contains some vigorous description, but shows little knowledge of the period of which it treats. She composed, in association with her sister Anna Maria, *Tales round a Winter's Hearth*, 1826, which was followed by *The Field of Forty Footsteps*, which was dramatized. Her last work, *Sir Edward Seaward's Diary*, 1831, so closely imitated the style of the period to which it relates, as to make it doubtful, owing to its anonymous publication, whether it was a novel. Her younger sister, **Anna Maria**, (1781–1832,) wrote many novels, in which the heroes and heroines are always endowed with a monotonous superexcellence of virtue.

PORTER, Joshua, 1730–1825; b. Conn., educated at Yale college, and became a physician. He was a member of the state legislature; colonel in the state militia, and commanded a regiment at the battle of Saratoga.

PORTER, Moses, 1755–1822; b. Mass.; lieut. in the artillery in 1775, and served through the revolutionary war, and the war of 1812. He was at White Plains, Trenton, Brandywine, and Germantown. He was made capt. in 1791, was attached to Wayne's command in 1794, and col. in the light artillery in 1812. He commanded the artillery in the army under Wilkinson, was prominent at the capture of fort George in May, 1813, and was brevetted brig.gen. in the same year.

PORTER, Noah, d.d., ll.d., b. Conn., 1811; graduated at Yale college, 1831; taught school at New Haven, 1831–33; was a tutor at Yale, 1833–35, during which time he studied theology; became pastor of a Congregational church in New Milford, Conn., 1836; was pastor at Springfield, Mass., 1843–46, was elected professor of metaphysics and moral philosophy at Yale, 1846; and in 1871, on the retirement of president Woolsey, was chosen president of the college; spent a year in Europe, 1853–54; was principal editor of the revision of Webster's *American Dictionary of the English Language*, published 1864; published an elaborate treatise on *The Human Intellect, with an Introduction upon Psychology and the Soul*, 1868; and an abridgment of it, 1871; is the author also of *The Educational Systems of the Puritans and Jesuits compared*—a prize essay; *Books and Reading; American Colleges and the American Public; The Sciences of Nature versus the Science of Man*, a review of the philosophical opinions of Herbert Spencer. He has written many important papers for leading magazines; and is recognized as a thinker of great breadth and exactness, and as a theologian is thoroughly evangelical and singularly free from theological prejudice.

PORTER, Peter Buel, 1773–1844; b. Conn.; began the practice of law at Canandaigua, N. Y., 1795, and was member of congress 1809–13 and 1815–16. He was appointed maj.gen of the New York and Pennsylvania volunteers in 1813, commanded at the defense of Black Rock, now Buffalo, in July of that year, and took part in the battles of Chippewa, Niagara Falls, and fort Erie. In 1815 he was offered but declined the post of commander-in-chief of the army. He was one of the commissioners under the treaty of Ghent, secretary of state of New York, and secretary of war under the younger Adams.

PORTER, Sir ROBERT KER, 1780–1842; b. Durham, England; brother of Jane Porter; when but 10 years old became a student of the Royal art academy of London. Before he was of age he had painted several historical pieces of some pretensions. In 1804 he became court painter to the court of Russia, and in 1811 married the daughter of prince de Sherbatoff. He now became a soldier and traveler; was in Spain with sir John Moore in 1809; from 1826 to 1841 was British consul at Venezuela; and at the time of his death was visiting St. Petersburg. He published several volumes of travels.

PORTER, THOMAS, 1734–1833; b. Conn.; was with the British army at lake George in the French war of 1755, and afterward served in the Connecticut legislature. He was prominent in public affairs during the revolution; removed to Vermont in 1779, where he was for many years a member of the legislature, and judge of the county or superior court.

PORTER, WILLIAM DAVID, 1810–64; b. New Orleans; the son of commodore David Porter; entered the navy as midshipman in 1823, served in the Mexican war, was prominent in establishing the light-house system, and retired in 1855 with the rank of lieut. In 1859 he re-entered the service, and remained loyal, though his two sons joined the southern cause. In command of the *Essex*, he was prominent in the attack on forts Donelson and Henry, in the fight past the batteries on the Mississippi from Cairo to New Orleans, and in the assault on Vicksburg and Port Hudson. He disabled the confederate iron-clad *Arkansas*, which was blown up. For his many gallant services he was made a commodore in 1862, but owing to ill-health did little more active duty.

POR'TEUS, BEILBY, D.D., 1731–1808; b. York, England: educated at Christ's college, Cambridge, where he obtained a fellowship, and gained the prize for a poem on death; became in 1762 chaplain to archbishop Secker, and to George III. in 1769; appointed bishop of Chichester in 1776, and of London in 1787. He published: *A Summary of the Evidences of Christianity; Review of the Life and Character of Archbishop Secker.* Bishop Porteous was a man of learning, of liberal and enlarged views, sound judgment, deep and unaffected piety, and surpassed by few as a preacher in eloquence or pathos.

PORT-FIRE is a sort of slow match for firing guns. It consists of a paper tube from 16 to 20 in. in length, filled with a composition thus proportioned: saltpeter 666 parts, sulphur 222 parts, mealed gunpowder 112 parts. The composition is rammed with force into the paper barrel, and then when ignited it burns for a considerable period. As a substitute may be employed soft brown paper dipped in a solution of 2 oz. of niter to a gallon of water, dried, and rolled up to the size of a common port-fire. Another port-fire consists of a rod cut square, of lime, birch, or poplar, boiled for six hours in a solution formed by dissolving 1 lb. of nitrate of lead in 1 quart of water. The rod is subsequently boiled in spirits of turpentine. When thoroughly dried one yard will burn three hours.

PORT GLAS'GOW, a parliamentary burgh and sea-port of the county of Renfrew, Scotland, is situated on the Clyde, about 2 m. e. of Greenock, and 20 m. n.w. of Glasgow. It was founded in 1668 by the magistrates of Glasgow as a harbor for the ships that belonged to or traded with their city—the Clyde at Glasgow being then inconveniently shallow, and the idea of deepening the river not having yet occurred. In 1695 the town and a small adjacent district were made into an independent parish; in 1710 it was constituted the principal custom-house on the Clyde, and for a while took the lead of Greenock; in 1775 it was incorporated as a municipality, and by the reform bill of 1832 it was raised to the rank of a parliamentary burgh, uniting with Kilmarnock, Rutherglen, Dumbarton, and Renfrew in electing a member of the legislature. Port Glasgow is rather a well-built town. The principal buildings are the town-house, custom-house, and churches of the different denominations. Port Glasgow has extensive manufactures of sail-ropes, chain-cables, several sugar-refineries, foundries, building-yards, commodious quays, and an extensive wet-dock. The deepening of the Clyde, enabling large vessels to ascend to Glasgow, seriously injured its commercial prosperity, but the trade has been for many years improving; the shipping employed is considerable. In 1876, 38 ships, of 17,066 tons, were registered at Port Glasgow; and in the same year 53 vessels, of 27,406 tons, were built here. Pop. '71, 9,851; parl. constituency (1877–78), 1158.

PORT HENRY, a village in n.e. New York, pleasantly situated on the s.w. shore of lake Champlain, 2 m. from mount Bulwagga; pop. '70, about 1000. The surrounding country abounds in magnetic iron ore, which it exports. It is on the Hudson and Delaware railroad, 40 m. n. of Whitehall, and 35 m. s.w. of Burlington. It has a well-organized fire department, public schools, 2 newspapers, 4 churches, and several blast furnaces and blomeries for the manufacture of iron.

PORT-HOLES are embrasures or openings in the side of a ship of war to enable the guns to be ranged in battery. The port-holes are ordinarily square, of size sufficient to enable the guns to be pointed at a considerable angle. In stormy weather the ports are closed, the guns being run in. When the guns are run out and no fighting is anticipated, half-ports are employed to keep the water out. There is a row of ports for each gun-deck, and by these rows the rating of the vessel is described as three-decker, two-decker, etc. Within the port rings are fixed through which the ropes are passed for working the heavy guns.

PORT HOPE, a t. in Ontario, dominion of Canada, on the n. shore of lake Ontario; pop. '71, 5,114. It is the co. seat of Durham co., and the s. terminus of the Midland railway on the Grand Trunk. It is 63 m. from Toronto, in a beautiful valley, on the side of a hill from which a fine view of the lake is obtained. A daily line of steamers runs to Charlotte, N. Y., connecting with Rochester by rail. It has water-power, a fine harbor, and an active trade in lumber and grain. It is the seat of Trinity college, and has 2 newspapers, 6 churches, several hotels, and 3 branch banks. It has a large fleet of fishing vessels, and manufactories of woolen goods, buttons, leather, wooden ware, steam engines, machinery, iron castings, etc.

PORT HURON, a city in s.e. Michigan; incorporated 1857, at the head of the St. Clair river, in the county of St. Clair, and opposite Sarnia, Canada; pop. '74, 8,240. It is on the Grand Trunk railroad, at the terminus of the Chicago and Lake Huron; 58 m. n.e. of Detroit, 66 m. e. of Flint, and 110 m. e. of Lansing. Large quantities of lumber are carried down the Black river to this point, and the trade in lumber and shingles is important. It is near the foot of lake Huron, connected with Sarnia by steam ferry-boats, and by steamers with Detroit, and its domestic and foreign commerce is considerable. Two horse-railroads lead to fort Gratiot, 1½ m. distant, where the Grand Trunk railway crosses the St. Clair, and the ferry to port Sarnia connects it with the Great Western line. The Black river at this point is crossed by two bridges. It is supplied with water by the Holly system, and has flour and saw mills, grain elevators, ship-yards, dry-docks, three newspapers, and the repair shops of the railroads. It is lighted by gas, has an opera-house, a national bank, a savings bank, public schools, and a fine city hall. In 1877 a government building, for a custom-house and post-office, was erected, costing $250,000.

PORTICI (formerly *Portico*), a town of southern Italy, is situated on the slope of Vesuvius, near Herculaneum, 4 m. s.e. from Naples, with 11,288 inhabitants. Its environs are delightful, and are dotted all over with country houses. There is a royal palace built by Charles III., but it is crossed by the high road, which divides it in two. Facing the palace is a fortress rising out of the sea, and there is a small harbor called the Granatello.

PORTICO, a covered space with a roof supported by columns. It is usually attached to an important building, but sometimes detached, as a shady walk. A portico is called tetrastyle, hexastyle, octostyle, and decastyle, according as it has four, six, eight, or ten columns in front.

PORTION, though not a legal term, is often used in the law of intestacy and legacies, and means a sum of money given to a child in discharge of the obligation incumbent on a parent; and from the circumstance of its being often given on marriage it is called a marriage-portion. By the law of England and Ireland, therein differing from the law of Scotland, a parent is not bound at common law to give any portion to his children. But he often does so by will; and, in the event of his dying intestate, the law does so for him. When a testator by will leaves a legacy to a daughter, child, or person, toward whom he stands *in loco parentis*, and afterward in his lifetime gives the child a like sum of money, or even a less sum as a portion on marriage, such portion is *prima facia* presumed to be in satisfaction, or an ademption of the legacy, unless there is something in the will or settlement to rebut that presumption. But in Scotland there is no such presumption, unless the father was liable by contract to give the portion.—Paterson's *Comp. of E. and S. Law*, 711. See TOCHER.

PORTIONERS, in the law of Scotland, mean two or more females who succeed jointly to heritable estate in default of heirs male, corresponding to coparceners in England. See HEIRS-PORTIONERS.

PORT JERVIS, a village in Orange co., N. Y., on the Delaware and Hudson canal; a station on the Erie railroad. The place is at the junction of the Delaware and Neversink rivers, and marks the intersection of the boundary lines of Pennsylvania, New York, and New Jersey; pop. '70, 6,377. Port Jervis was named in honor of J. B. Jervis, the chief engineer of the canal. The place is surrounded by picturesque scenery. There are three newspapers, one a daily; three banks, many factories, and railroad repair shops.

PORTLAND, a city and sea-port of Maine, situated on an arm of the s.w. side of Casco bay, lat. 43° 39' n., long. 70° 15' w., 105 m. n.e. of Boston. It is beautifully situated on a peninsula 3 m. long by three-fourth of a mile broad, with broad shaded streets, and handsome public and private edifices. Among the former is a fire-proof iron and granite building for the United States courts and custom-house; a city hall, of olive-colored freestone, 150 by 232 ft.; public halls and libraries, charitable mechanics' association, atheneum, society of natural history's hall and cabinets, public schools, and 27 churches. There are 16 newspapers, 4 of which are daily. The harbor of Portland is large, deep, and well sheltered, and is the winter-station of the Canadian steamers. It is defended by forts Preble and Scammell. There are five railways, including one to Quebec and Montreal, locomotive and marine engine manufactories, sugar refineries, and a large coasting trade. Portland, first named Falmouth, was settled by an English colony in 1632, and was three times burned in the wars with the French and Indians. In 1866 a fire destroyed $10,000,000 worth of property. Pop. '70, 31,413.

PORTLAND (*ante*), a city in s.w. Maine; incorporated 1832; Indian name, Machigonne. It was originally a part of Falmouth, and includes several small islands in the bay; 1666 acres; pop. '80, 33,810. It is 60 m. s.w. of Augusta, 292 m. s.e. of Montreal, and is connected with Montreal and Detroit by the Grand Trunk railway, furnishing, since 1853, direct means of transportation from those ports to the sea. It is the terminus of the Boston and Maine railroad, the Portsmouth, Saco and Portland, the Portland and Rochester, the Portland and Ogdensburg, and the Maine Central. Grain is shipped from San Francisco to this city without change. It is the fifth city in size in New England, and its trade with the West Indies, South America, and Europe, as well as along the coast, is important. The annual value of the exportation of lumber, sugar, ice, fish, etc., averages $22,000,000; the value of the imports being $20,000,000—four-fifths of it representing transhipments to Canada. The value of the tonnage has exceeded 126,000 in one year. The sales of merchandise are estimated at $40,000,000; annual value of manufactures $9,000,000. It has a marginal railway around the water front, and two dry docks. It has regular steam communication between Liverpool and Glasgow and the principal cities on the coast. Besides the forts which protect the harbor there are granite casemated fortifications on Hog Island ledge which command the four entrances. Ship building and the manufacture of iron are important industries, also that of petroleum, carriages, furniture, varnishes, boots and shoes, moccasins, cement pipe, leather, soap, sleighs, jewelry, etc. Canned corn and lobsters are largely exported. It has six national banks with an aggregate capital of $3,050,000, and two savings banks with deposits amounting to $8,000,000. It is lighted by gas, has three horse-railroads, and is supplied with water brought 17 m. from lake Sebago to Bramhall's hill in the w. part of the city, the reservoir containing 12,000,000 gallons. The company was organized in 1867. It contains 30 churches, is the seat of the Episcopal bishop of Maine, and of a Roman Catholic bishop. Its charitable institutions include a female orphan asylum, and a home for aged women; among the public institutions are the state reform school, the U. S. marine hospital, and a school for deaf mutes. Besides those mentioned above, it contains more than 60 societies for charitable objects, and the advancement of scientific learning and literature. It is the seat of a medical school, incorporated 1858, and contains the Portland institute and public library, incorporated 1867, 15,000 vols.; the mercantile library, 1851, 5,000 vols., having been collected since the fire of 1866; and the law library. The collections of the society of natural history were burned in 1854 and in 1866, but a new one has been made containing specimens of great value. The atheneum (incorporated 1826) library of 12,000 vols. was destroyed in 1866, but has been restored. Portland has a well-organized fire department. Among the fine buildings for which it is noted is a mechanics' hall built of granite; the granite custom house, ornamented with marble, costing $485,000; the post-office of white Vermont marble; and the granite and brick building of the Maine charitable mechanic association, incorporated 1815, containing a fine hall, library of 5,000 vols., and costing $36,000. From the hills on either side a fine view of Casco bay may be obtained. In the center is Lincoln park, 2¼ acres.

PORTLAND, a city, the co. seat of Multnomah co., Oregon, on the w. bank of the Willamette river, about 120 m. from the Pacific; pop. '75, 12,500. It is on the Oregon Central and the Oregon and California railroads, and connected by steamer with San Francisco, Olympia, Victoria, and Sitka, and many places on Puget sound and the Columbia and Willamette rivers. It contains churches, schools, a court-house, an insane asylum, 3 banks, 13 newspapers, a library, and a seminary for girls. Among the articles manufactured are engines, boilers, carriages, furniture, nails, and lumber. Large amounts of wheat, flour, and lumber are exported. The city is regularly laid out, and the streets are lighted with gas. The city has water-works, a fire department, and a police department. It was surveyed in 1845, and received a city charter in 1851. The fire of Aug. 2, 1873, caused a loss of more than $1,000,000. It is a place of much enterprise and business prosperity.

PORTLAND, a t. in St. John co., New Brunswick, next to Saint John; pop. 12,520. It has steam saw-mills, foundries, ship-yards, etc.

PORTLAND BEDS, a division of the upper oolites (q.v). occurring between the Purbeck beds and the Kimmeridge clay, and so named because the rocks of the group form the promontory of the isle of Portland. They consist of beds of hard oolitic limestone and freestone, interstratified with clays, and resting on light-colored sands, which contain marine fossils. The corals found in the sands are often converted into flints, the original structure being beautifully preserved in the hard silex. The beds may be traced from the isle of Portland, capping the oolitic hills as far as Oxfordshire. The fossils are chiefly mollusca and fish, with a few reptiles.

PORTLAND CEMENT. See CEMENT.

PORTLAND ISLE, a rocky peninsula projecting into the English channel from the shore of Dorsetshire, 17 m. w.s.w. of St. Alban's head. Its appearance suggests the shape of a beak, and it is therefore called also the Bill of Portland. It is 9 m. in circumference, is composed of oolitic limestone, and slopes southward, with an even surface from the height of 490 ft. to that of 30 ft. above sea-level. Its sides are extremely rugged, and are worn into fantastic caverns by the furious action of the waves. The peninsula is supposed to have been once an island, but for ages it has been connected with the mainland by Chesil bank, an extraordinary ridge of loose shingle, which, after running n.w. in a straight line close to the shore for about 10 m., joins the mainland at Abbotsbury. South-west winds prevail on this part of the coast, and during their continuance the long ridge of Chesil bank is lashed by a frightful sea, and is the scene of frequent shipwrecks. A long narrow inlet of the sea, called the Fleet, extends between Chesil bank and the shore, and is the haunt of numerous wild-fowl. Portland castle, in the north of the isle, is a ponderous building, erected by Henry VIII. as a protection for this part of the coast in 1520. The peninsula furnishes the famous Portland stone (q.v.). Portland breakwater, built of stones obtained on the island, partly described under the article breakwater (q.v.), has provided a secure harbor for hundreds of the largest ships; in connection with it are also a naval station, harbor of refuge, and batteries. Pennsylvania castle, in a most romantic district on the east coast, was built by John Penn, the grandson of the founder of Pennsylvania. Rufus castle, or, as it is commonly called, Bow-and Arrow castle, also on the east coast, is now a ruin, and is generally said to have been built by William Rufus. On Portland bill, the southern extremity of the island, are two light-houses, one 130 and the other 197 ft. above sea-level. Between the southern point and the shambles, three m. to the s.e., a dangerous surf, well known as the race of Portland, is raised by the rushing of the impetuous tides. The convict prison, near the e. coast, erected in 1848, consists of eight wings, besides the hospital, chapel, barracks, and cottages for the warders. It accommodates upward of 1500 convicts, besides the officers, and is maintained at an annual cost of upward of £50,000, or at the rate of £33 per prisoner. The inhabitants of the island long remained a peculiar people, intermarrying and preserving, generation after generation, the many curious customs of their ancestors. The island itself is chiefly remarkable for its abundant supply of excellent spring water, for its building-stone, and for its breed of sheep, the flesh of which, well known as Portland mutton, is celebrated for its flavor. The pop. of the parish of Portland Isle amounted in 1871 to 9,907.

PORTLAND SAGO. See ARUM.

PORTLAND STONE. This celebrated building-stone, of which many of the principal buildings of London, including St. Paul's cathedral, Somerset house, and many of the churches are constructed, is the oolitic limestone of Dorsetshire, constituting geologically the Portland and Purbeck beds. The quarries are chiefly located in the islands of Portland and Purbeck, and in the vale of Wardour. The quantity raised is very large. During the heavier works at the Portland breakwater 730,000 tons per annum were required for that structure alone, and about 30,000 to 40,000 tons are sent annually to London and other places. There are three different qualities of the stone in the same quarry: the uppermost contains numerous fossils, and is of a coarse grain; it is therefore used chiefly for rough work, such as foundations. It is called roach by the quarrymen. The middle bed is much broken, and is called the rubble or rubbly bed, and is of little value; and the lower one is fine, white, and compact, and is called the whit, or best bed. This last is that which is used for fine building purposes. An analysis of this stone by prof. Daniell shows the following composition:

Silica	1.20
Carbonate of lime	95.16
Carbonate of magnesia	1.20
Iron and alumina	0.50
Water and loss	1.94

Besides which ingredients, there is often a trace of bitumen present.

PORTLAND VASE. A beautiful cinerary urn of transparent dark-blue glass, found about the middle of the 16th c. in a marble sarcophagus near Rome (see the article GLASS, where it is figured and described). It was at first deposited in the Barberini palace at Rome (and hence often called the Barberini vase); it then became (1770) the property, by purchase, of sir William Hamilton (q.v.), from whose possession it passed into that of the duchess of Portland. In 1810 the duke of Portland, one of the trustees of the British museum, allowed it to be placed in that institution, retaining his right over it as his own property. In 1845 a miscreant named William Loyd, apparently from an insane love of mischief or a diseased ambition for notoriety, dashed this valuable relic to pieces with a stone. Owing to the defective state of the law, only a slight punishment could be inflicted; but an act was immediately passed, making such an offense punishable with imprisonment for two years, and one, two, or three public or private whippings. The pieces of the fractured vase were carefully gathered up, and afterward united in a very complete manner; and thus repaired, it still exists in the museum, but is not shown to the public. A small number of copies of the Portland vase were made many years ago by Mr. Wedgwood, and were sold at 25 guineas each.

PORTLAW', a small manufacturing t. of the county of Waterford, Munster, Ireland, about 10 m. w.n.w. of Waterford. Portlaw has risen within the last 40 years from a small village into a town of great activity and of extensive manufactures, through the enterprise of a single family named Malcomson, by whom the cotton manufacture has been introduced with great success. The pop. in 1871 was 3,774, considerably more than 3,000 of whom were Roman Catholics, the remainder being principally Protestant Episcopalians. Portlaw is admirably provided with schools and other institutions for the social and moral improvement of the population.

PORT LOUIS, the capital and principal port of the British colony of Mauritius, is situated on an inlet on the n.w. coast. Its streets, though narrow, are straight, and are furnished with footpaths, and macadamized. It contains a number of public buildings, among which are a theater, library, hospital, and botanic garden. Its harbor is capacious, but is quite safe only during the fine season. The imports and exports of the colony are mainly transacted at Port Louis; and their quantity, value, and character are mentioned under the article Mauritius (q.v.). Pop. of the port is estimated at 65,000 (1871).

PORT MAHON' (anc. *Portus Magonis*), the capital of the island of Minorca (q.v.), is beautifully situated on a deep and narrow inlet in the s.e. of the island. Its harbor, sufficiently spacious to accommodate a large fleet of men-of-war, is one of the finest in the Mediterranean, and is protected by three forts. It has no architectural features worthy of special notice, but is on the whole well built. The military governor and the bishop of the island reside here. The government buildings were mostly constructed while the island belonged to England. Pop. 13,300.

PORTNEUF, a co. in central Quebec, Dominion of Canada, having the St. Lawrence river for its s. boundary, drained by the river St. Maurice, the Portneuf river, the Great and Little Wayagamack lakes, and lake Edward in the n.; 7,255 sq.m.; pop. '71, 23,216. Its surface is generally level, with a fertile soil. The country is well timbered, and its rivers furnish extensive water-power for carding, saw, and grist mills. It has a large trade in flour and lumber. The manufacture of nails is among its industries. Co. seat, Cap Santé.

PORTO ALE'GRE, a t. of Brazil, capital of the province of Rio Grande do Sul, stands at the n.w. extremity of the lake of Patos, by means of which it communicates with the sea. It was founded in 1743, is well built, and contains 20,000 inhabitants. It is provided with wharfs; and its trade, though by no means inconsiderable, has hardly shared to the full in the recent advancement of the prosperity of Brazil.

PORTO-BELLO, a parliamentary burgh and watering-place, occupies a plain on the s. bank of the firth of Forth, in the county of Edinburgh, and 3 m. e. of the city of that name by the North British railway. A commodious new town-hall was recently built. This town is a favorite resort for sea-bathing and summer quarters during the season. A marine promenade, a m. in length, runs along the shore; and there is an elegant iron pier, 1250 ft. long, with seats to accommodate 2,000 persons, and a spacious saloon for the use of visitors. Porto-Bello is also a manufacturing town, and its manufacturing establishments comprise potteries, and earthenware, bottle, brick, and paper works, etc. Pop. '71, 5,878; and, in summer, between 7,000 and 8,000. The town derives its name from the first house built here about the time of the seizure of the town of Puerto-Bello, in the isthmus of Panama, and called Portobello.

PORTO BELLO. See PUERTO BELLO.

POR'TO FERRA'JO. See ELBA.

PORTO MAGGIO'RE, a t. in the province of Ferrara, Italy, 4 m. e. of Commachio, and about 20 m. from the Adriatic; pop. '74, 15,150. The town is an island in the lagoons of the Commachio, and the inhabitants are employed in eel-fishing and in trading in cattle. The climate is malarious. There is an improbable tradition that the place was in former centuries a sea-port.

PORTO-MAURI'ZIO, a seaport t. of n. Italy, capital of a new province of the same name, on the gulf of Genoa, 58 m. directly s.w. of Genoa city. Area of province, 467 sq. miles. Pop. '71, 126,953. The town stands on a high promontory, projecting boldly into the sea, and has a lofty church, painted in brilliant colors. The harbor, defended by a mole, is generally crowded with the picturesque coasting-vessels of the Mediterranean. There is an extensive trade in olive-oil and agricultural produce. Pop. 6,256.

PORTO NOVO, a t. in the Madras presidency of India, situated on the Coromandel coast, in lat. 11° 31' n., and long. 79° 51' east. Both the Danes and the Dutch had formerly a factory here. The place is celebrated for the battle fought here on July 1, 1781, when sir Eyre Coote defeated Hyder Ali. The British force consisted of only 7,878 men, including artillery; Hyder's army numbered over 60,000. Coote was retiring before Hyder. After leaving Porto Novo, he had only advanced a few m. along the sea shore, when he found his path intercepted by the enemy's batteries, the sea confining him on the right, and a range of sand-hills on the left. The British army made two assaults; in one, they carried the batteries; in the other, they took advantage of an opening in the sand-hills, which Hyder had neglected to guard, and came suddenly upon the enemy's flank. A schooner of war meantime standing in close, poured her broadsides of small guns into the enemy. Their rout was complete. Porto Novo is celebrated for its iron foundry, which of late years has supplied much of the material for the Madras railways. Pop. of Porto Novo, called by the natives *Parangipetta*, about 7,200.

PORTO RI'CO. See PUERTO RICO.

PORTO SANTO, an island in the Atlantic ocean, 25 m. n.e. of Madeira, to which it belongs; about 24 sq.m.; pop. about 1500. The surface is uneven, with little timber. The soil is barren. The principal productions are barley, corn, live stock, and a poor variety of wine.—The town of Porto Santo has a good harbor, resorted to by ships going round the cape of Good Hope. Columbus at one time lived at Porto Santo, which was discovered by the Portuguese in 1418.

PORT PAT'RICK, a burgh of barony and fishing village of Scotland, in the county of Wigtown, and 8 m. s.w. of Stranraer. It is surrounded by hills on the land side, and its harbor is protected by two piers, and has a light-house. It is the nearest point of Scotland to the Irish coast, distant only 21½ miles. Pop. '71, 1488.

PORT PHIL'LIP. See MELBOURNE.

PORTREE. See SKYE.

PORTREEVE (from *port* and *reeve*, Saxon *gerefa*, a word of similar origin to the German *graf*, signifying a governor or chief magistrate), the principal magistrate in a maritime town. This was the early name of the officer afterward called mayor in London and elsewhere.

PORT ROYAL-DES-CHAMPS, a convent of Cistercian nuns, near Versailles, which obtained much celebrity during the 17th century. It was founded for nuns by a member of the family of Montmorenci, in the early part of the 13 c.; and soon after its establishment, obtained from the pope the privilege of receiving lay persons, who, without taking monastic vows, desired to live in religious retirement. This portion of the Port Royal-des-Champs institute in later times became of great importance. The discipline of the convent having been much relaxed in the 15th and 16th centuries, one of its worst abuses—that of appointing the superior, not on account of fitness, but from considerations of family or other worldly or political motives—became in the end the occasion of its complete reformation. Angelique Arnauld, sister of the celebrated brothers Arnauld, was appointed, when a mere child, coadjutrix of the abbess, and on the death of this lady, although she was then only in her eleventh year, herself succeeded to the office. As mêre Angelique advanced in years, she felt moved, although still very young, by a profound sense of her responsibilities, and undertook a complete and rigid reformation of the community, which she carried out in all its details—as the strict observance of religious poverty, abstinence from meat, complete seclusion, and the most severe ascetic exercises. The community was removed to Paris in 1626, and in 1633 to a new convent, which was thenceforword called Port Royal-de-Paris; and from this time the old establishment of Port Royal-des-Champs was exclusively devoted to the use of a lay community, in accordance with the original papal privilege. This community quickly became very celebrated, and soon numbered among its inmates some of the most distinguished scholars of that age, Antony Arnauld, Le Maistre, Antony and Louis Isaac le Maistre de Sacy, Nicole, Lancelot, Sericourt, and several others. Their rule of life was most austere, rising at 3 A. M., devoting many hours to prayer and spiritual reading and instruction, and a portion of the day to manual labor. One of their most important public services was the establishment of a school, for which they prepared the well-known educational books known under the name of Port Royal, the Greek and Latin grammars, general grammar, geometry, art of thinking, etc. This school was for a time transferred to Paris, a portion of the nuns being sent back to Port Royal-des-Champs; but eventually it was established at an out-farm of the latter place, called Les Granges.

Port Royal-des-Champs, however, is even more known in history through its relations with the Jansenist controversy. The nature and origin of these relations have been explained in the article Jansen (q.v.). It only remains to relate the later fortunes of Port Royal-des-Champs and its members, in so far as they were affected by the proceedings taken in consequence by the authorities, whether civil or ecclesiastical. The nuns of Port Royal-des-Champs having refused to subscribe the formularly condemning the five propositions, a royal order was issued in 1630 for the suppression of the school, and the removal of the boarders of Port Royal-des-Champs; and at length the abbess, and several other nuns, were arrested, and confined as prisoners in other monasteries. After the "peace of Clement IX.," they were permitted to return; but the two communities, Port Royal-des-Champs and Port Royal-de-Paris, were placed under separate government. This led to many disputes, and to a perpetuation in Port Royal-des-Champs of the Jansenistic spirit and the Jansenistic opinions; and when the final steps for the repression of that party were taken about 1707, a formal bull was issued by pope Clement XI. for the suppression of that convent, and the transfer of its property to Port Royal-de-Paris. The nuns, accordingly, were finally dispersed and distributed over convents of different orders throughout France. The property of the convent and church were transferred to the Paris house, and all the buildings of Port Royal-des-Champs were leveled to the ground, by order the king. Most of the eminent names connected with Port Royal-des-Champs will be found treated under separate heads.

PORT SAID', a t. in Egypt, about 80 m. s. of Damietta, at the Mediterranean end of the Suez canal; pop. about 8,500. It contains a reservoir and a light-house. Its harbor, made by colossal piers of concrete, has ample docks and accommodations for vessels. It has an export trade in cotton, and is a coaling station of importance.

PORTSEA ISLAND, a small island on the s. coast of Hampshire, has on its w. side Portsmouth harbor, on its s.e. side Langston harbor, on its e. side Chichester harbor, and is separated from the mainland on the n. by a narrow channel, crossed by several bridges. It is 4 m. long, by from 2 to 3 m. broad, and contains the important towns of Portsea and Portsmouth (q.v.).

PORTSMOUTH, a city and the only sea-port of New Hampshire, is on the s. bank of the Piscataqua river, 3 m. from the Atlantic, and 54 m. n.n.e. of Boston; a well-built town, having 10 churches, atheneum, state arsenal, academy and public schools, 2 market-houses, alms-house, 5 banks, manufactories of cotton and hosiery, foundries, and breweries. There is a safe and deep harbor, a U.S. navy-yard, having a balance-dock 350 ft. long, and 2 forts, McCleary and Constitution. Settled in 1623. Pop. '70, 9,211.

PORTSMOUTH (*ante*), a city in s.e. New Hampshire, incorporated 1849; previous to 1807 capital of the colony and state, except during the revolution. It is the terminus of the Eastern, Concord and Portsmouth, the Portsmouth and Dover, and the Portland and Saco railroads; pop., '80, 9,732. It is nearly surrounded by water, and is connected by bridges across the Piscataqua with Kittery, Me., where is what is commonly called the Portsmouth navy-yard, and with Newcastle on Grand island. Many ships are built here for the merchant service, and the harbor is capable of accommodating 2,000 vessels with good anchorage, 480 having found shelter there at one time by actual count. The depth of water varies from 35 to 75 feet. The harbor contains many small picturesque islands, and the tides and rapid current preserve it from ice and sand-bars. Forts Constitution and McClary having been condemned, earthworks have been erected at the e. side of the entrance, and on Jerry's point, on the w. side. The city has an ancient, conservative appearance, and in summer is beautifully shaded by numerous ornamental trees; and on the hillside sloping toward the harbor are the fine old estates with large gardens attached which give it the character for health and beauty for which it is distinguished. The floating balance-dock in the navy-yard was constructed at a cost of $800,000, has 24 pumps, and 2 steam-engines. In 1690 the *Falkland*, 54 guns, was constructed here by order of the British government; the *America*, 50 guns, in 1749, for the same power; the *Ranger*, 18 guns, 1777, by order of the continental congress, of which Paul Jones was first commander—the first to carry the stars and stripes and to receive the salute; and the *North America*, built on Badger's island. The city has good educational advantages, a library of 11,000 volumes, and a reading-room in the athenæum; also a cabinet of minerals and specimens of natural history. It contains a mercantile library association with 2,000 vols. It has 6 newspapers, including the oldest newspaper in America, established 1756, called *The New Hampshire Gazette.* Its local trade is important, and its commerce considerable along the coast and with foreign ports. Among the articles of manufacture are iron castings, shoes, cod liver oil, soap, carriages, sleighs, etc. It contains the Kearsarge cotton mills, 26,000 spindles. It is well supplied with water, and has 6 banks, 4 national, with an aggregate capital of $950,000, and 2 institutions for savings, with deposits to the amount of $2,750,000, a trust and guarantee company with a capital of $200,000, 2 military companies, and a well-organized fire department. At Rye, formerly Little Harbor, is the mansion of gov. Wentworth, and near the navy-yard is the tomb of sir William Pepperell.

PORTSMOUTH, a village of Ohio, on the n. bank of the Ohio river, at the mouth of the Scioto, the terminus of the Scioto and Hocking Valley railway, and Ohio and Erie canal, 115 m. e. by s. from Cincinnati, and 90 s. of Columbus. It has 14 churches, 2 iron foundries, 3 machine-shops, 2 distilleries, 6 banks, and 5 newspapers. Pop. '60, 6,268; '70, 10,592.

PORTSMOUTH (*ante*), a city in s. Ohio, 170 m. below Parkersburg, W. Va.; the s. terminus of the Portsmouth branch of the Marietta and Cincinnati railroad; pop. '80, 11,314. Its harbor is accessible to the largest vessels, and is ¾ of a mile wide. It is connected by a line of steamers with Baltimore. Hills of moderate height rise above the plain on which it is built, and on the opposite shore of the river the bank rises to the height of 500 feet. It has a court-house, 14 churches, public schools, a young ladies' seminary, 7 building associations, 5 national banks with an aggregate capital of $950,000, an opera house, a masonic temple, and 2 odd fellows' halls. It is lighted by gas and supplied with water by the Holly system. Among its manufactures are paper, engines and boilers, agricultural implements, hubs, stoves, furniture, and soap; among its manufactories are lumber mills and 2 freestone saw-mills. In the vicinity are valuable beds of iron, which is mined and largely exported. The products of the mineral regions of s. Ohio and n. Kentucky are shipped from this point. Its commerce is important and constantly increasing, and it is the center of the fertile district of the Scioto valley.

PORTSMOUTH, a city and port of Virginia, on the w. bank of Elizabeth river, opposite Norfolk, and 8 m. from Hampton Roads. It has a court-house, scientific and military academy, 5 newspapers, 13 churches, tobacco factories, etc., and connections with the southern railways. Its proximity to fortress Monroe caused it to be held, during the war of secession, by the federal forces. Pop. '70, 10,492.

PORTSMOUTH (*ante*), a city in s.e. Virginia, in Norfolk co., 1 m. s.w. of Norfolk, 150 m. by water, and 104 m. by rail, s.e. of Richmond; on the Atlantic, Mississippi and Ohio railroad, at the terminus of the Seaboard and Roanoke; pop. '80, 11,388. It is connected by ferry with Norfolk, and lines of steamers run to all the principal cities on the coast, by which cotton, lumber, oak staves, pig iron, and vegetables are shipped in large quantities. It has also a considerable wholesale trade in coal, fertilizers, groceries, and liquors. It is regularly laid out on a low, level plain. At Gosport, at the s. extremity of the city, is the U. S. navy-yard, dry dock, and naval hospital. Its harbor is conveniently accessible to the largest vessels, and its leading industries are the manufacture of cars, carriages, and barrels. It has 2 banks, an insurance and banking company, 3 hotels, 2 academies, public schools, and many private schools.

PORTSMOUTH, the chief naval arsenal of Great Britain, and an important seaport, market-town, and municipal and parliamentary borough, in the s. of Hampshire, stands on the s.w. shore of Portsea island (q.v.), at the entrance to Portsmouth harbor, and opposite the town of Gosport, with which it communicates by means of a steam-bridge. It is 74 m. s.w. of London by the London and South-western railway. Besides the parish of Portsmouth, the limits of the municipal and parliamentary borough, which are co-extensive, include also the parish and town of Portsea, and the out-wards Landport and Southsea. The population of the borough, with its suburbs, was (1871) 113,569. Portsmouth is for the most part a mean-looking, dirty town; but has the most complete fortifications in Britain. These comprise, on the landward side, the outer line of the Portsdown forts and the Hilsea lines; to seaward, the Spithead forts. The bastioned ramparts, which formerly encircled both Portsmouth and Gosport, and were so imposing in appearance, have recently been removed as useless. Southsea, which is situated outside the walls skirting Southsea common, is rapidly increasing, and is now a fashionable watering-place. In the town proper there are few objects of note. Pleasing views may be had from the ramparts and batteries, as the harbor, the roadstead of Spithead, and the isle of Wight, on the coast of which the white walls of the royal residence of Osborne house are seen gleaming among the trees. Among the few notable buildings may be mentioned the church of St. Thomas, the chancel and transepts of which date from the 12th c., and which contains a ghastly cenotaph in memory of the murdered duke of Buckingham (see *infra*). In front of the garrison chapel is buried the brave sir Charles James Napier (q.v.), who died in this neighborhood in 1853. The dockyard of Portsmouth, in the district of Portsea, was till lately only 116 acres in extent; but vast works have recently been carried out, at a cost of £2,500,000, which have increased the area to a total of 293 acres. Of this immense naval establishment, the most noteworthy if not the most recent features are the mast and rope houses, hemp-stores, rigging-stores, sail-loft, and the dry docks, spacious enough to admit the largest vessels, and offering every facility for their speedy repair. The 12 docks vary from 22 to 36 ft. deep, lined with solid masonry, and roofed over, and closed by lock-gates. Of the various building-slips, one of them, roofed and covered in, is so large that three or four vessels can be in process of construction under it at the same time. The wood mills contain a number of most ingenious block-making machines, the invention of sir Isambard Brunel, in which rough timber, introduced at one end, is cut, squared, drilled, bored, and turned into the required shape. About 150,000 blocks are made here annually, and the machines require the attendance of no more than four men. In the smithy, anchors are forged by aid of a Nasmyth's hammer. The dockyard also contains the residences of the superintending officers and a school of naval architecture.

Portsmouth harbor, about 420 yards wide at its entrance, expands into a spacious basin, extending inland for about 4 m., and having a breadth of 3 m. along its northern shore. Large war-vessels can enter and lie at anchor at all times of the tide. The outward entrance is defended by Monkton fort and Southsea castle. The position of this harbor is highly favorable. It is situated in the middle of the channel, close to the magnificent anchorage of Spithead, where 1000 ships of the line may ride without inconvenience, and is under shelter of the isle of Wight, and opposite the French arsenal of Cherbourg.

The local trade of Portsmouth is supported by the dockyard and the other public establishments of the town. Brewing is largely carried on. Coals, cattle, sheep, corn, and provisions are imported from our own coasts, and timber and wine from abroad. In 1875, 1937 vessels, of 185,756 tons, entered, and 1080, of 58,446 tons, cleared the port.

The importance of this port dates only from the reign of Henry VIII. Its defenses were strengthened by Elizabeth, and afterward in a more thorough manner by William III. Here, in a house that still remains in the High street, and which was then an inn called the "Spotted Dog," the duke of Buckingham (the "Steenie" of king James) was assassinated by John Felton. On Aug. 29, 1782, when its commander, admiral Kempenfeldt, was writing in his cabin, the *Royal George* went down in the harbor, and nearly 1000 lives were lost.

PORTUGAL, the most westerly kingdom of Europe, a part of the great Spanish peninsula, lies in 36° 55′ to 42° 8′ n. lat., and 6° 15′ to 9° 30′ w. long. Its greatest length from n. to s. is 368 m., and its average breadth from e. to w. about 100 miles. The kingdom of Portugal proper is bounded by the Atlantic on the s. and w., and by Spain on the n. and east. The table gives the area and pop. of the seven old provinces, still popularly retained, with the corresponding official districts:

Provinces.	Districts.	Area in Square Miles.	Pop. 1875.
Minho	Viana, Braga, Porto.	2,810	973,882
Tras os Montes	Braganza, Villa-Real.	4,275	374,887
Beira Alta	Aveiro, Coimbra, Viseu.	4,533	980,730
Beira Baixa	Guarda, Castello-Branco.	4,688	388,868
Estremadura	Leiria, Santarem, Lisboa.	6,907	858,876
Alemtejo	Portalegre, Evora, Beja.	9.889	342,979
Algarve	Faro.	1,868	192,916
Total		34,470	4,057,538

Islands.—The Azores, 920 sq.m.; pop. '75, 261,746. Madeira, etc., 330 sq.m.; pop. 121,753. The islands are officially reckoned as belonging to the home territories.

The colonial possessions of Portugal are, in *Africa*—Cape Verd islands, 1630.02 sq.m.; pop. 76,003. Senegambia, 35,437.50 sq.m.; pop. 8,500. Islands of San-Thome and Principe, off Guinea, 448.56 sq.m.; pop. 23,681. Ajuda, 12 sq.m.; pop. 700. Angola, Benguela, 200.602.50 sq.m.; pop. 2,000,000. Mozambique and dependencies, 283,500 sq.m.; pop. 300,000. In *Asia*—Goa, Salcete, 1440.6 sq.m.; pop. 474.234. Damao, Diu, 94.08 sq.m.; pop. 53,283. In the Indian Archipelago, 2,877 sq.m.; pop. 250,000. Macao, 11.76 sq.m.; pop. 71,739. Total of colonies, 526.041.48 sq.m.; pop. 3,258,140.

Physical Aspect, etc.—Portugal must be regarded as essentially a littoral country, forming the Atlantic or western part of the Spanish peninsula, from which it is separated by political, rather than physical boundaries. Its mountains and rivers are, with few exceptions, mere western prolongations of those of Spain. The principal mountain ranges lie about half-way inland, leaving almost the whole of its 500 m. of coast-line a flat sandy tract, with few rocky headlands, and hence there are scarcely any harbors or places of safe anchorage, except at the embouchures of the larger rivers. The highest range is the Serra de Estrella, which, passing from n.n.e. to s.s.w., through Beira and Estremadura, terminates in the steep acclivities of Cintra and Cap la Rocca, near Lisbon. The principal chain, which is also known as the Serra da Junto, merges in a series of ridges, which cover a tract 30 m. in length, between the Tagus and the sea. Another mountain range, named the Serra de Calderao and the Serra de Monchique, but constituting a mere continuation of the Spanish Sierra Morena, crosses the southern part of Portugal from e. to w., and terminates in its most southern promontory of Cape St. Vincent. These ranges, with the numerous mountain-spurs that intersect the northern districts in every direction, so thoroughly occupy the area of Portugal that there are only two or three plains of any extent in the whole country, and these are situated to the w. of the Guadiana, in Alemtejo, and in Beira and Estremadura, near the Tagus and Vouga. The valleys are very numerous, and by their great fruitfulness present a striking contrast to the barren and rugged mountains by which they are inclosed. The principal rivers enter Portugal from Spain. Of these the largest are the Guadiana, which, leaving Spain near Badajoz, forms in part the boundary between the southern provinces of the neighboring kingdom; while the Minho and Douro, flowing w., form a part of the boundary in the n. and n.e. The Tagus, or Tejo, intersects Portugal from its northern frontier to the southern termination of the Estrella mountains, where it enters the sea a little below Lisbon. The Mondego, the largest river belonging entirely to Portugal, after receiving numerous affluents in its course, falls into the sea about midway between the Douro and the Tagus. The larger rivers, although obstructed at their mouth with dangerous bars, afford admirable means of internal navigation, together with the numerous lesser streams, and might, through canals, be connected into one great system of water-routes; but hitherto nothing has been done to improve these great natural advantages Except a few mountain tarns, Portugal has no lakes. It has salt-marshes on the coast, near Setubal in Estremadura, and Aveiro in Beira, whence large quantities of salt are annually obtained by evaporation. Mineral springs are abundant in many parts of the country, but hitherto they have been almost wholly neglected.

The vicinity to the western ocean tempers the climate of Portugal and exempts it from the dry heat by which Spain is visited. The great inequalities of the surface produce, however, great diversities of climate; for, while snow falls abundantly on the mountains in the northern provinces, it is never seen in the lowlands of the southern districts, where spring begins with the new year and harvest is over by midsummer. Rain falls abundantly, especially on the coast, from October to March, and, as a general rule, the climate is healthy in the elevated districts even of the southern provinces; but malaria and fever prevail in low flat lands and near the salt marshes. The mean annual temperature at Lisbon is 61° Fahr.

The natural products correspond to the diversity of the physical and climatic conditions; for while barley, oats, and wheat, maize, flax, and hemp, are grown in the more elevated tracts, rice is cultivated in the lowlands, the oak thrives in the northern, the chestnut in the central, and the cork, date, and American aloe in the southern parts, while every species of European, and various kinds of semi-tropical fruits and vegetables, are grown in different parts of the country. The soil is generally rich, but agriculture is everywhere neglected, and is scarcely made subservient to the wants of the population. The cultivation of the vine and that of the olive are almost the sole branches of industry; from the former is derived the rich red wine familiarly known to us as port, from its being shipped at *O Porto,* "the port." The mineral products include gold, antimony, lead, copper, marble, slate, coal, iron, and salt, but of these the last is alone worked in sufficient quantity for exportation, and is in eager demand for the British market, on account of its superior hardness, which adapts it specially for the salting of meat for ships.

The finest cattle are reared in the n., the horses of Alemtejo and the sheep of Beira are most valued. Mules and asses are the principal beasts of burden. Goats and pigs are numerous, and are raised at a very low cost in all the mountain districts. The rearing of bees and silk-worms is being pursued with somewhat increased energy of late years. Fish is abundant in all the rivers and on the coast. The tunny and anchovy fisheries of Algarve are of considerable importance.

Commerce, etc.—The commercial industry of the country falls very far below its physical capabilities, and Oporto and Lisbon are the only centers of manufacture and trade. the former of which has important silk and glove manufactories, and produces an inconsiderable quantity of linen, cotton, and wool fabrics, metal and earthenware goods, tobacco, cigars, leather, etc. But in the 19 years preceding 1870 the agricultural exports had doubled. In 1873, 4,941 foreign vessels entered, and 4,973 cleared the ports of Portugal; of Portuguese sea-going vessels, 724 entered, and 1102 cleared; and of coasters, 5,452 entered, and 5,134 cleared. In June, 1878, 674 m. of railway were open, and 154 more in course of construction, principally in the environs of Lisbon, Oporto, Santarem, and Vigo; but the country is almost entirely without roads, the few which exist having been made only within the last thirty years, before which time the whole of the kingdom was in the same impassable condition in which the southern provinces still remain. The scarcity and inefficiency of bridges and the total want of canals render internal traffic almost impracticable, and, as a matter of course, put an impassable barrier in the way of the progress of civilization and the growth of material prosperity.

The exports, which consist almost entirely of wine, fruits, oil, and cork, are chiefly sent to Great Britain and her colonies. In 1875 the exports from Portugal to England were valued at £4,444,071. Among these exports, the wine alone monopolized two-thirds of the total value. The great bulk of Portuguese imports are from the United Kingdom, and in 1875 had a value of £2,563,067.

The budget for 1876–77 gives the total of the receipts, which are derived from direct and indirect taxation and from the national domains, at 24,059,984 milreïs; while the expenditure, including home and foreign debts, the charges of the state, public works, etc., is estimated at 25,062,727 milreïs (1 milreïs = 55 pence). There has been no budget for the last 30 years without a deficit. The budget for the foreign possessions of Portugal gives for the same year the receipts at 2,027,124 milreïs; expenditure, 1,930,164 milreïs. The national debt in 1876, including foreign loans, amounted to 355,778,014 milreis (upward of £79,000,000).

Army and Navy.—The actual strength of the army was, in 1877, rated at 1512 officers and 38,917 men. The colonial army has 547 officers and 7,298 men. The navy consisted in 1876 of 26 steam-vessels, carrying 133 guns, and 11 vessels without steam-power, with 35 guns. The principal naval depots are at Lisbon and Oporto. Portugal has 55 fortresses, the greater number of which are mere fortified castles. Among the more important are Elvas, S. Julians Cascaes, Pininhe, Almeida, and Valença. There are six orders of knighthood—viz., the order of Christ, founded in 1319; St. Benedict of Avis; the tower and sword, founded in 1459, and reorganized in 1808; our lady of Villa Viçosa, established in 1819; and the order of St. John of Jerusalem, which was separated in 1802 from that of Malta. Besides these, there is one civil service order, founded in 1288.

Religion, Education.—Portugal belongs almost exclusively to the church of Rome, and shows little toleration to other creeds. At Lisbon and Oporto, Protestant places of worship are, however, sanctioned by the government. Portugal is divided into three dioceses, which are presided over by the cardinal patriarch of Lisbon, the archbishop of Braga, who is primate of the kingdom, and the archbishop of Evora; and these, with the fourteen bishops, belong to the grandeza, or higher nobility. The number of clergy holding cures is given at 18,000. The monasteries have been dissolved since 1834, but convents for nuns still exist. Portugal stands below the other countries of Europe in regard to education; which is now superintended by a superior council, at the head of which is the minister of the interior. Public education is entirely free from the supervision and control of the church. Compulsory education was enacted in 1844, but is far from fully enforced. In 1874 there were in Portugal and its islands 2,631 elementary schools, with 2,212 male and 509 female teachers, and 118,000 pupils; there are 18 lyceums, and 57 other secondary schools; polytechnic academies at Lisbon and Oporto; and clerical, medical, naval, and military training schools. The one university at Coimbra, one of the oldest in Europe, has 5 faculties, 52 professors, and about 1000 students. Lisbon has a learned society (the academy of sciences), and a public library of 300,000 volumes.

Law, Government, etc.—The administration of the law is effected by means of 111 courts of justice, 6 of which are located at Lisbon, where also the high court of appeal holds its sittings. The courts are public, and in some cases trial by jury is adopted. Excepting in regard to suits referring to trade, law is still administered in accordance with the Alfonsine code of the 15th c., and the Código Filippino, or code of Philip IV. of Spain.

Portugal is a constitutional monarchy, the crown being hereditary alike in the female and male lines. The houses of representatives are called *cortes*, and consist of the *camaras dos pares*, and the *camaras dos diputados*, the former composed of grandees, chosen for life by the sovereign, and the latter of 149 members, elected by voters. The monarch is assisted by a cabinet of six ministers of state, and a council composed of members chosen for life. He bears the title of king of Portugal and of Algarve "on both sides of the ocean." The heir-apparent bears the title of prince of Beira. The winter residence of the king and court is the palace dos Necessidades at Lisbon, which at other seasons is exchanged for the palaces at Mafra, Queluz, Bemfica, and Ramalhao. The nobility is divided into *titulados* and *fidalgos*, and these, with the upper officials, higher clergy, etc., constitute one-eighth of the whole population. Very many of the fidalgos having been reduced to the condition of paupers, subsisting on charity, a law was passed in 1844, partly abolishing hereditary aristocracy, it being made dependent on the possession of an annual income of £500, together with an academical degree. The members of the second chamber are chosen directly by all citizens having an income of £22. The deputies must have at least £89 per annum; but graduates of any of the learned professions need no property qualifications. Lisbon (q.v.), the capital, is the center of the small amount of literary, artistic, and manufacturing activity in Portugal. Besides Oporto (q.v.) and the capital, there is no city whose population exceeds 20,000, and only 11 which have more than 10,000 inhabitants.

Race.—The Portuguese are a mixed race. In Algarve and Alemtego the Arabic element is still very perceptible, and the people of those provinces have dark-brown skins, and tall, slim, but lithe and active figures; while the natives of the more northern districts, with lighter skins, have less regular features, small eyes, and short, thick-set figures. Although the Portuguese may very probably be regarded as the remains of the original population of the Peninsula, they differ essentially from their Spanish brethren, whom they now regard with inveterate hatred and jealousy on account of their attempts a few centuries ago to annihilate the independence of Portugal. They indulge in interminable verbosity, ceremonious flattery, and servile politeness, and they are inclined to extravagance and display. They are, however, intensely patriotic, brave, persevering, enterprising, cheerful, and ready to oblige. As a people, they are dirty and slovenly; few persons among them possess any great degree of mental culture, and the lower orders are even unable to read or write, and hence the grossest superstition and bigotry prevail in every class of the population.

History of Portugal.—The earliest notice which we have of the western portions of the Spanish peninsula, is derived from the Romans, who followed the Carthaginians as conquerors of the territories of the ancient Iberians and western Celts. Under Augustus, the peninsula was divided into three provinces, governed by prætors, of which the western province of Lusitania comprised the greater part of the present kingdom of Portugal, besides portions of Leon and Spanish Estremadura. When the Romans withdrew from the peninsula, which was rapidly overrun by Visigoths from the north, and at a later period by Saracens from the south, Lusitania was overwhelmed in one common ruin with Iberia or ancient Spain. About the middle of the 11th c. it fell under the sway of Ferdinand I. of Castile. In 1095 Henry of Burgundy, who had married a natural daughter of Alfonso VI. king of Castile, the successor of Ferdinand, received from that monarch the government of Portugal from the Minho to the Tagus, as a dependent fief. It is maintained, however, by Portuguese authorities, that even from this time the country was independent. His son, Alfonso I., gained signal advantages over the Arabs, and, by his gallantry and prudence, secured the affections of the people. After the great victory which he gained over the Moslems, in the plain of Ourique, in Alemtejo, in 1139, his soldiers proclaimed him king. His successes on this occasion inflicted a serious check on the advance of the infidels, and in recompense for the services which he had thus conferred on Christendom, the pope confirmed his title, which had been unanimously ratified by the cortes of Lamego. The Burgundian house, which continued in possession of the throne for 400 years, gave to Portugal some of its noblest and best kings. The immediate successors of Alfonso I. were engaged in many severe struggles with the clergy and nobles, who were always ready to combine against the sovereign; but although often baffled in their attempts to uphold the independence of the crown, the dignity of the kingdom was, on the whole, well maintained by the representatives of this family, who are, moreover, distinguished as the promoters and upholders of the maritime glory of Portugal. Dinis (Dionysius), who succeeded Alfonso III. in 1279, must be regarded as the founder of Portuguese commerce and mercantile enterprise. This king, moreover, encouraged the industrial arts, and protected learning, in furtherance of which he founded, in 1284, a university at Lisbon, which was transferred, in 1308, to Coimbra. Dinis was succeeded in 1325 by his son, Alfonso, surnamed the brave, whose reign was almost wholly occupied in wars with the Castilians and the Moslems. With Alfonso's grandson, Ferdinand I., the legitimate branch of the Burgundian house became extinct in 1383. After some disturbances, his illegitimate brother, Joam (John), was recognized by the cortes as king in 1385. His reign was eventful, not merely on account of the internal reforms which he introduced into the state, and of his steady maintenance of the prerogatives of the crown, but chiefly as being associated with the commencement of those vast and important geographical discoveries and commercial enterprises, to which Portugal owed the position she occupied during that and the succeeding age as the greatest maritime power of Europe. To Joam's son, Enrique (Henry) the navigator, is due the merit of having organized various voyages of discovery, and inaugurated a regular system of colonization, which, during the reign of Joam II. (who ascended the throne in 1481), culminated in the successive acquisition by Portugal of the Azores, Madeira, Cape de Verde, and other islands; in the doubling of the cape of Good Hope under Bartholomeo Diaz; and, as the result of the latter, in the successful achievement of the passage by sea to India, which was effected, in 1497, under the command of Vasco de Gama, in the reign of Joam's successor, Manoel. The discovery of Brazil, and the settlements made there and on the western coast of India, increased the maritime power and fame of Portugal, which were further extended under Manoel's son, Joam III., who ascended the throne in 1521. At this period, Portugal ranked as one of the most powerful monarchies in Europe, and Lisbon as one of its most important commercial cities. Sudden as this course of prosperity had been, its decline was almost more abrupt, and may in a great measure be referred to the influence of the priests, for the introduction into Portugal of the inquisition in 1536, led to the expulsion of the numerous wealthy and industrious Jews, on whose able financial management the commercial interests of the Portuguese were largely dependent and gave rise to an amount of social tyranny and oppression, both in the colonies and at home, which, coupled with a bad system of government, depressed the energy and crippled the resources of the nation. The influence of the Jesuits under the minority of Joam's grandson, Sebastian, and their evil councils in urging their young king to enter upon a fatal expedition to Africa against the infidels, led to still further miseries. The defeat of the Portuguese, and the capture and death of the young king at the battle of Alcazar in 1578, and the extinction of the old Burgundian line in 1580, after the brief reign of Sebastian's uncle, Enrique, plunged the country into difficulties and misfortunes of every kind, which lost none of their weight, although they changed in character. After a struggle for the throne between many eager candidates, none of whom found favor with the nation at large, who persisted in cherishing the delusive hope that Sebastian was still alive, and would return from the hands of his infidel captors, Philip II. of Spain succeeded in securing to himself the crown of Portugal, and annexing the Portuguese kingdom to the Spanish monarchy. This event proved disastrous in the extreme to Portugal, for, besides bringing the country to the brink of ruin, by mal-administration and misappropriation of its resources, it involved it in all the ruinous wars of Spain in the Low Countries and in Germany, a great part of the expenses of which it was made to bear; while the Dutch, in retaliation for Spanish aggressions at home, attacked the Portuguese settlements in Brazil, and almost completely deprived them of their possessions in the Indian archipelago. The insolence of Philip IV.'s minister, Olivarez, brought matters to a crisis, and in 1640, after a forced union of 160 years, Portugal was freed, by a bold and successful conspiracy of the nobles, from all connection with Spain, and the duke de Braganza, a descendent of the old royal family, placed on the throne, under the title of Joam IV. The war with Spain, which was the natural result of this act, terminated in 1668, when, by the treaty of Lisbon, the independence of Portugal was formally recognized by the Spanish government. For the next hundred years, Portugal vegetated in a state of inglorious apathy. Her ancient glory had departed never to return, the nation was steeped in ignorance and bigotry, and from having been one of the greatest maritime powers of Europe, the Portuguese were content with becoming a commercial dependent rather than ally of Great Britain. Under the reign of Joseph I., who died in 1777, the genius and resolution of the minister, Pombal (q.v.), infused temporary vigor into the administration, and checked for a time the downward tendency of the national credit. Pombal's efforts to rouse the people from their sloth, and infuse vigor into the government, were frustrated by the accession of Joseph's daughter, Maria, who, with her uncle-husband, Pedro III., allowed things to fall back into their own channels. The mental alienation of Maria led, in 1709, to the nomination of a regency under her eldest son, Joam. This prince, who showed considerable capacity in early life, finding that he could not maintain even a shadow of independence on the outbreak of the war between Spain and France, threw himself wholly on the protection of England; and finally, when he learned that Napoleon had determined on the destruction of his dynasty, left Portugal in 1807, accompanied by all his family, and transferred the seat of his government to Rio Janeiro, the capital of Brazil. This act was immediately followed, on the part of the French, by the occupation and annexation of Portugal—a measure which gave rise to the peninsular war. The victory of Vimeira, gained by the combined English and Portuguese army in 1808, freed the land from its French assailants; and in 1810, on the death of queen Maria, the regent succeeded to the joint crowns of Portugal and Brazil. The continued residence of the new king, Joam VI., at Rio Janeiro, gave occasion to abuses and discontent, which resulted, in 1820, in the outbreak of a revolution at Lisbon, and the proclamation of a constitutional form of government in the place of the pre-existing absolutism. After a period of great national excitement and political disturbance, the differences between the sovereign and people were so far adjusted, that Joam agreed to and signed the constitution of Portugal, and ratified the independence of Brazil, which was to be governed by his son, Dom Pedro, while he himself retained only the title of emperor. On the death of Joam in 1826, Pedro IV., after organizing the government of Portugal on the model of the French charter, renounced the Portuguese crown in favor of his daughter, Doña Maria da Gloria, on condition of her marriage with her uncle, Dom Miguel. The latter, who, during the lifetime of Joam, had availed himself of every opportunity to thwart the more liberal policy of his father and brother, waited only for the embarkation of the English troops to break the oath which he had taken to maintain the constitution, and gathering round him all who were in favor of restoring the old order of things in Portugal, he was through their aid declared king by the cortes, which met in June, 1828. A period of indescribable confusion, misrule, and anarchy followed. The nobles, monks, and rabble ruled the land; 13,000 Portuguese citizens went into exile, while double that number of persons, suspected of favoring the constitutional party, were kept in confinement. At length, in 1832, Dom Pedro was enabled, chiefly by means of a loan from Englishmen, to raise a fleet, and make a landing at Oporto. Admiral Napier, in the meanwhile, operated on the coast of Algrave successfully in favor of the young queen, whose cause, by these victories, and the support of an alliance with the great powers, finally proved victorious. Doña Maria made her entry into Lisbon in 1833; and in the following year Dom Miguel signed the convention of Evora, by which he renounced all pretensions to the throne, and agreed to quit Portugal. The death of Dom Pedro in the same year, after he had effected several important reforms, proved a heavy misfortune to Portugal, which suffered severely from the mercenary rule of those who occupied places of trust about the person of the young queen. Her marriage, in 1835, with Augustus, duke of Leuchtenberg, his death at the end of a few months, and her second marriage, in 1836, with prince Ferdinand of Saxe-Coburg, were followed by grave political disturbances, which in course of time were aggravated by the personal avarice and want of good faith of those in whom the young queen placed her confidence. A branch of the democrats, known as the Septembrists, from the month in which they made their first decisive stand against the government, loudly demanded the abrogation of the charter promulgated by Dom Pedro (and known as the *carta de ley de* 1826), and the restoration of the constitution of 1820. This contest of the charters may be said to have continued through the entire reign of Doña Maria. The government was alternately in the hands of Septembrists and chartists, toward both of whom the queen acted with a degree of duplicity that frustrated every effort at an adjustment of the national disorders. Insurrections and counter-insurrections were of frequent occurrence; the troops were not to be depended on in moments of emergency; guerrilla bands scoured the country at will, and openly defied the queen's authority. The absolutists, or Miguelites, took advantage of the general disorder to produce a reaction in favor of the old church party. The financial embarrassments were complicated in the extreme; while the obstinacy of the nation in regard to the maintenance of the slave-trade, in defiance of treaties and pledges, brought them into temporary collision with Great Britain, the only ally on whom Doña Maria could rely. An armed intervention of the great powers in 1847 produced a partial abatement of the national disorders; and matters might have permanently improved, had not the queen's partiality for her unpopular ministers, count Thomar and his brother Cabral, and her determination to leave the administration of affairs in their hands, exasperated the general discontent and distrust of the court, and led to the insurrection, which, without bloodshed, made the national idol, the marquis de Saldanha, *de facto* military dictator of Portugal, and evoked a general expression of the popular wish for the queen's abdication. Saldanha's ministry, although begun under good auspices, soon manifested the same readiness to succumb to the views of the court which had characterized former ministries. One cortes was dissolved after another, and finally, in 1852, the government declared itself prepared to carry out necessary reforms without the concurrence of the cortes, and to demand at a future period a bill of indemnity for its acts. At this crisis the queen died suddenly, and her eldest son ascended the throne in 1853, as Pedro V., under the regency of the king-consort, his father. The latter used his power discreetly; and, by his judicious management, the financial disorders were partially adjusted. Upon the sudden death in 1861 of Pedro, his brother was proclaimed king as Luis I. He has steadily adhered to constitutional principles, and aims at the internal improvement of the country; and, in spite of frequent ministerial crises, and continual financial difficulties, the resources of the country are developing. When the insurrection of gen. Prim broke out in Spain, the Portuguese chambers declared unanimously against any proposals for an "Iberian union."

PORTUGUESE LANGUAGE AND LITERATURE. The Portuguese, like every other branch of the Romance family of languages, has grown out of a local form of the *Lingua Romana Rustica*, which in course of time had ingrafted upon it many elements of Arabic from the Saracen invaders of the country, and numerous verbal and idiomatic characteristics of the Frankish and Celtic dialects, which were introduced with the Burgundian founders of the Portuguese monarchy. The earlier forms of Portuguese bore close affinity with the Galician, and although, in course of time, it presented strong resemblance to its sister language, the Castilian, in as far as both possessed numerous words of identical origin, it differed so widely from the latter in regard to grammatical structure, as almost to merit the designation of an original tongue. The antipathy existing between the Portuguese and Spaniards, and the consquent strenuous efforts of their best writers to keep their language distinct, and to resist the introduction of further Castilian elements, had the effect of making Portuguese still more dissimilar from the sister tongues of the peninsula, and the result is the production of a language differing from pure Spanish in having an excess of nasal sounds, and fewer gutturals, with a softening or lisping of the consonants, and a deepening of the vowels, which renders it the softest, but least harmonious, and the feeblest of all the Romance tongues. The earliest specimens of genuine Portuguese belong to the beginning of the 13th c., and consist for the most part of collections, or books of songs (*Cancioneiros*), which, both in regard to form and rhythm, resembled the troubadour or *minne* songs of the same period. Of these, the oldest is the *Cancioneiro dél Rei Dom Diniz*, or Book of Songs, by king Diniz, who had long been regarded by the Portuguese as their earliest poet, but whose poems were supposed to be lost, till they were discovered about 40 years since, in MS. in the library of the Vatican, and published at Paris and Lisbon in 1847. In the 14th and 15th c., the court continued to be the center of poetry and art, as it had been under Diniz; but Castilian was in greater vogue than Portuguese, which was despised by the numerous royal poets, who emulated the example of Diniz, and composed love-songs and moral or didactic poems. Under the culture of these noble bards, the poetry of Portugal remained weak and effeminate, without acquiring even the tenderness and pathos which characterized the Spanish romances of that age. The poetry and literature of Portugal acquired new vigor with the growth of her maritime and commercial glory, and the *Cancioneiro Geral* (Lisb. 1516) of the poet Garcia de Resende, which gives a general summary and extracts of all the Portuguese poets of the latter half of the 15th, and beginning of the 16th c., affords evidence of this improvement, which is most strongly exemplified in the sentimental pastorals or romances, and the national eclogues of Bernardino Ribeiro and Sá de Miranda, whose eclogues and prose dramatic imitations of Plautus and Terence, mark the transition period between the mediæval lyrical and the later classical style. These first attempts at the drama were followed by Antonio Ferreira, whose *Ines de Castro* is the oldest Portuguese tragedy. But the classical school, whose chief cultivators were the courtiers of Lisbon and the professors of Coimbra, found little favor among the people at large, for the discoveries and conquests of the nation in Asia, Africa, and America excited an enthusiasm and self-consciousness in the people, which led them to crave for something more practical and natural than the stilted style of the classicists. At this crisis, when Portugal was at the zenith of her material prosperity, appeared her greatest poet, Camoens, who, in his immortal epic, *Os Lusiadas*, which appeared in 1572, struck out a new path in the domain of epic poetry; while his numerous sonnets, 300 in number, his *Cançoes* or songs, his *Redondillas*, dramas, and other poetic productions, exhibit a versatility of genius and graceful tenderness which place him in the foremost rank of European poets.

With Camoens and his contemporary, Gil Vicente, the language and poetry of Portugal reached the culminating point of their development. During the dominion of Spain, the Portuguese so far lost all feeling of national independence and patriotism, that they at length renounced their native tongue, and adopted the language of their foreign rulers. With the restoration of political independence, under the sway of the Portuguese house of Braganza, a reaction took place; but the 17th and 18th c. produced few Portuguese writers who attained more than an ephemeral and purely local reputation—bombast, or slavish imitation of Spanish and Italian writers, being the predominant characteristics of the Portuguese school of light literature. Some good historical writers belong, however, to this period, as Jacinto Freire de Andrade, whose life of

Joao de Castro, viceroy of India, still holds its place as the most perfect monument of classical prose; the great Indian missionary, the Jesuit father Antonio Vierra, who died in 1699, and whose sermons and letters—of which a collection was published at Lisbon in 1748, and at Paris in 1838—are regarded by his countrymen as models of style and diction; F. X. da Meneses, the author of *O Portugal Restaurado* (1741), etc. In the beginning of the present century, Portuguese poetry was partially redeemed from its previous low grade by two men, who, although they professed to observe a strictly classical style, possessed a delicacy of taste, and a genial creative power, which saved them from falling into the absurdities that had generally characterized the school in Portugal. The elder of these, F. M. do Nascimento, who died in exile at Paris in 1819, although specially noted as an elegant lyrist, deserves notice for his gracefully written miscellaneous papers; while Manoel de Bocage, his less cultivated rival and contemporary, must undoubtedly be regarded as the most original and truly national of the modern poets of Portugal. His sonnets rank as the finest in the language, and these, with his numerous idylls, epigrams, and occasional poems, composed in various styles and modes of versification, have had a host of imitators, among the best of whom are the dramatist J. B. Gomes, J. M. da Costa e Silva; the satirist, T. da Almeida; and the Brazilian, Antonio Caldas, distinguished for his sacred epics, and various imitations of Milton and Klopstock. The best of the recent Portuguese poets are M. de Albuquerque, A. de Castilho, and A. de Carvalho, and J. B. d'Almeida Garrett. The last-named, whose collected poetic and prose works appeared at Lisbon in 1840, was at once the most versatile and popular writer of his time in Portugal. In the departments of travels, geography, and history, Portugal has produced good writers from the earliest periods of its literary history; and in recent times, the works of B. Machado, J. Ferreira, and A. de Cajo, have well maintained the national reputation.—Portuguese literature is also cultivated in Brazil, and, of late years, with more success than in the parent country. The principal names in Brazilian poetry are Gonçalves Diaz, Macedo Abreo, and Magalhaens; in history, Varnhagen, author of the *Historia General de Brazil* (1854), and P. da Silva, author of the *Brazilian Plutarch;* besides some divines, philosophers, and translators from the classics.

PORTUGUESE MAN-OF-WAR (Jelly-fish). See Acalephæ, *ante.*

PORTUGUESE WINES. Many varieties of the grape are cultivated in Portugal, and the wines produced are very numerous. From the Douro district, a mountainous tract near Oporto, port wine is derived. The first pipe of port is said to have been shipped in the year 1678. During the ten years following 600 pipes were shipped each year. In 70 years the annual exportation rose to 17,000 pipes. In 1757 the monopoly of the wine company was established, and continued to the year 1833, when it was abolished. During these 77 years the annual exportations amounted to 33,300 pipes. A new company was established in 1843, but abolished in 1867. A large percentage of brandy is generally added to port wine, because it is the quickest and most certain means of making the wine marketable and salable to the consumer. The principal vines grown in the Douro are the *Verdeilho, Mourisco, Bastardo, Alvarilhao, Touriga, Tinta Francesca,* and the *Tinta Caa.* The wine is exported principally to Great Britain, the annual value amounting to over £1,000,000 sterling. In 1877 that country imported 4,069,555 gallons, costing £1,338,552. The wines known as *Palmella* and *Inglezhinos* are grown in the neighborhood of Lisbon. Of Portuguese white wines may be mentioned those of *Lisbon, Barcellas, Carcavellos, Arinto, Termo,* and *Setuval;* of the red variety are *Lavradio, Lamego, Torres Vedras, Monçaon,* and *Colares.* See Port Wine, *ante.*

PORTULACEÆ, or Portulacaceæ, a natural order of exogenous plants, nearly allied to *caryophyllaceæ*, from which it differs chiefly in the generally perigynous stamens, the calyx consisting of two sepals which are united at the base, and the capsule frequently opening transversely. The species are not very numerous; they are much diffused over the world, and are shrubby or herbaceous, generally succulent, mostly growing in dry places. The flowers are often large and beautiful, but ephemeral. The foliage is bland and insipid. Some species are used as salads and pot-herbs, of which the best known is purslane (q.v.). The tuberous roots of *Claytonia tuberosa*, a Siberian plant, are used for food, as are those of the melloco (*melloca tuberosa* or *ullucus tuberosus*), a Peruvian plant, sometimes referred to this order. The genus *calendrinia* furnishes some beautiful annuals.

PORT WINE (i.e., *Porto* or *Oporto wine*), a species of red wine, hot and heady, which is produced chiefly in a mountainous district of Portugal, called Cima de Douro, and exported from Oporto and Lisbon. The vine from which this wine is produced is generally planted on craggy slopes with a southern exposure. The grapes are gathered from the commencement of September to the middle of October. The cultivation and gathering of the grapes for port wine employ annually 10,000 cultivators and 20,000 gatherers. The wine, when pure and unadulterated (which is very seldom the case), does not acquire its full strength and flavor till it has stood for some years, but care must likewise be taken that it is not allowed to become too old. The color of new port wine varies from pale rose to deep red, and changes with age, becoming a deep tawny brown, which is permanent. By far the greater portion of the wine made is mixed with spirit even during the time of fermentation, in order to give the new wine the ripeness and strength which exporters require, and which the wine does not naturally attain till it has stood for some time; the proper color is also given by an ingredient known as *jeropiga*, which is a preparation of elderberries, molasses, raisin-juice, and spirit. It is an excess of this jeropiga in the inferior sorts of port which communicates to them the medicated odor so frequently noticed. The extreme "headiness" of port is chiefly due to the liberal admixture with spirit, and this is the case with all the sorts generally exported. From the time when port came into demand (about 1700, though it was known in England for a considerable time before this) down to 1826, its export was a monopoly in the hands of the English merchants, and the amount of wine produced increased, with tolerable steadiness, year after year till 1836, when it reached 38,459 pipes, valued at £1,122,500. The ultimate effect of this monopoly was to increase the price of port wine in England, and at the same time so to deteriorate its quality, that in course of time it became of less demand, and was gradually, to some extent, supplanted by southern French and other wines. Since 1836 it has fluctuated, being sometimes more and sometimes less than this figure; in 1850 the exportation reached 37,487 pipes, of which 25,400 were sent to Great Britain. In 1875 the quantity of wine imported into Great Britain from Portugal was 35,500 pipes; value, £1,492,761.

PORUS, King, in the time of Alexander the great, ruled over northern India, near the Hydaspes river. When Alexander invaded his country, he prepared to defend the passage of the stream; but the Grecian general crossed some distance above the Indian camp, and surprised and defeated successively Porus's son and the king himself. The captive monarch conducted himself with great dignity, and won the regard of Alexander, who treated him with much generosity.

PORY, John, b. England, about 1570; d. previous to 1635; entered Gonvil and Caius college 1587, made a translation of the *Geographical History of Africa* by John Leo, a Moor, called the only original authority for the state of n. and central Africa of that period; republished in Purchas's *Pilgrimes*. He was living in Paris in 1612, and 1619–21 was secretary to the colony at Jamestown, Va. On his return voyage to England he stopped at Plymouth, and visited the colony then recently arrived. He assisted Hakluyt in the preparation of his geography, and in 1623 came back as a commissioner from the privy council.

POSCHAREVATZ. See Passarowitz.

POSEI'DON. See Neptune.

PO'SEN, a province of Prussia, bounded n. by Pomerania and east Prussia, e. by Poland, s. by Silesia, and w. by Brandenburg and Pomerania. Area 11,150 sq.m. Pop. at the close of 1875, 1,608,956. It is divided into the two governmental districts of Posen and Bromberg; and the principal towns are Posen, Bromberg, Lissa, Rawitsch, and Gnesen. The principal river is the Wartha, which traverses Posen from e. to w., and is navigable throughout the greater part of its course, as is also the smaller Netze. The country is almost everywhere level, and its surface extensively covered with bogs, ponds, and small lakes. The soil is on the whole fruitful, and the numerous swamps and forests which covered the land during its annexation to Poland have of late years been converted into rich meadow and good arable land, where cattle of superior quality are raised, and good crops of wheat, barley, oats, and flax are procured. The forests are extensive and productive, and contribute largely to the exports of the province, of which, however, the most important articles are corn, wool, tallow, hides, wax, and honey. With the exception of coal, which is obtained from beds near the town of Wronki, Posen has no mineral products. Good broad-cloth, linens, and lace are manufactured in many of the small country towns. Since the annexation of Posen to Prussia much has been done to supply the previous deficiency in regard to popular instruction; and there are now nine gymnasia, several normal and training schools, a seminary for priests, and upward of 2,000 burgher and national schools. The greater part of the population belongs to the Roman Catholic church, which is under the spiritual jurisdiction of the archbishop of Posen and Gnesen, while 74,000 of the remainder are Jews. The inhabitants may still be said to be Poles, more than 800,000 persons employing Polish as their mother-tongue. Posen formed an integral part of Poland till 1772, when, at the first partition of the Polish territory, the districts n. of the Netze were given to Prussia. At the second and third partitions, which were made twenty years later, the remainder was incorporated in the Prussian kingdom under the name of South Prussia. In 1807 Posen was included in the duchy of Warsaw; but by the act of the congress of Vienna it was separated in 1815 from Poland, and reassigned to Prussia under the title of the grand duchy of Posen. In 1848 the Poles, who had never amalgamated with their new German compatriots, took advantage of the general political excitement of that period to organize an open rebellion, which gave the Prussian government considerable trouble, and was not put down till much blood had been spilt on both sides. On the cessation of disturbances the German citizens of the province demanded the incorporation of Posen with these Prussian states which were members of the German confederation, and the Berlin chambers gave their approval of the proposed measure in 1850; but on the subsidence of revolutionary sentiment in Germany the subject was dropped.

POSEN (Polish *Poznan*), the chief t. of the province of Posen, and a Prussian fortress of the first rank, is situated on the low and sandy banks of the Wartha, nearly 150 m. e. of Berlin. Pop. '71, 56,374; '75, 60,998—of whom not quite the half are Protestants, and toward 10,000 are Jews. Posen, which ranks as one of the most ancient cities of Poland, became the seat of a Christian bishop in the 10th century. Till 1296 it was the seat of the Polish dukes; and it was a member of the Hanseatic league during the middle ages, when it was an important trading mart between western Europe and the Slavonic lands bordering on Asia. At this time many German, English, and Scottish traders settled in Posen, which latterly fell into decay. It passed into the possession of Prussia in 1815. At the great fire of 1803, when many of the older parts of the town were destroyed, Posen lost the most striking features of its semi-oriental style of architecture; but it still retains a certain picturesque character from the number of its church towers and lofty houses. Among its fifteen principal churches the most noteworthy are the cathedral, a recently restored and elaborately ornamented building, and St. Stanislaus, a splendid specimen of Italian architecture. Posen, which has been strongly fortified since 1828, is encircled by six suburbs. It is the see of an archbishop, the seat of the provincial government, and has a fine town-hall, two gymnasia, a public library with 20,000 volumes, training-schools for teachers of both sexes, a school for midwives, a theater, etc. Recent restorations and improvements have rendered it one of the pleasantest-looking towns in Prussia, and it can now boast of many fine regularly-built streets and squares, in which are situated the winter residences of many of the provincial Polish nobles. A considerable trade in wood, corn, wool, broadcloth, and linen is carried on here, principally by the Jews, and the annual fairs held in summer attract large crowds from all parts of the province. The chief manufactures of Posen are cloth, leather, carriages, copper vats and other vessels used in distilling, and tobacco; while there are likewise several breweries, distilleries, and sugar-refineries.

POSES PLASTIQUES (Fr. "statuesque attitudes"), equivalent to tableaux vivants (q.v).

POSEY, a co. in extreme s.w. Indiana, drained by the Wabash and Ohio rivers, which divide it from Illinois and Kentucky; traversed by the Kentucky and South-eastern railroad; 430 sq.m.; pop. '80, 20,857—18,968 of American birth. The surface is hilly, but the bottom lands are very rich; tobacco, corn, wheat, oats, and grass are the chief products. There are factories making carriages, plows, and other agricultural tools. Co. seat, Vernon.

POSEY, THOMAS, 1750–1818; b. Va.; settled in West Virginia in 1769. He became a quartermaster in lord Dunmore's army, and was engaged in the battle with the Indians at Point Pleasant in Oct., 1774. The next year he assisted in the defeat of Dunmore at Gwyn's island. He afterward joined Morgan's riflemen, and fought with a force of British light infantry at Piscataway, N. J. Entering the army under Gates, he was at the battles of Bemis heights and Stillwater in 1777, and the same year conducted an expedition against the Indians. In 1779 he commanded a battalion under Wayne, and was prominent at the assault of Stony Point. He served with Wayne till the evacuation of Savannah, and was at the surrender of Cornwallis. He was appointed brig.gen. in 1793, and removing to Kentucky, was state senator, lieut.gov., and maj.gen. of militia. He was U. S. senator from Louisiana, 1812–13, gov. of the Indian territory, 1818–16, when he became commissioner of Indian affairs.

POSIDONIUS, b. Syria, B.C. 2d c.; came to Rome in the consulship of Marcus Marcellus, B.C. 51, and died, according to Lucian, at the age of 84. He was a pupil of Panætius, whom he succeeded as the leader of the stoics; and was the teacher of Cicero, who frequently speaks of him with praise. Pompey visited him B.C. 67, at Rhodes, where the greater part of his life was passed, and again B.C. 62, after the close of the Mithridatic war; and Posidonius wrote a history of the wars of Pompey. Besides his philosophical works, he wrote treatises on history, astronomy, and geography, none of which are extant, with the exception of their titles, and the quotations from them preserved by Cicero, Strabo, and others. He wrote *Meteorologica*, and Cicero alludes to his artificial sphere, which represented the motion of the heavens. He traveled much for the purpose of collecting information for his works, and Plutarch has taken from him the materials of several of the "lives," notably that of Caius Marius, whom Posidonius personally knew. He was a stricter stoic than Panætius, and maintained that pain was not an evil.

POSILIPO, a mountain on the n.w. of Naples, close by the city, remarkable for the tunnel known as the Grotta di Posilipo, through which the road from Naples to Pozzuoli (anc. *Puteoli*) passes. The grotto is in some places 70 ft. high, and 21 ft. wide, and is 2.244 ft. long. It is very ancient. Seneca mentions it as the *Crypta Neapolitana*. Strabo assigns its construction to M. Cocceius Nerva, superintendent of aqueducts in the time of the emperor Tiberius. Above the eastern archway of the grotto is the so-called "tomb of Virgil." At the base of the hill of Posilipo anciently stood the poet's villa, in which he composed the *Eclogues* and *Georgics*, if not also the *Æneid*. During the middle ages, the common people firmly believed the grotto to be the work of the poet, whom they regarded as a great magician.

POSITIVE PHILOSOPHY. See COMTE.

POSITIVE PRINTING, in photography. This term is used to designate that process by which impressions from a negative (q.v.) are produced upon suitably prepared paper. The term, however, does not belong exclusively to positives produced on paper, and intended to be viewed by reflected light, since transparent positives for examination by transmitted light are produced on glass. The means by which this kind of positives is obtained are so exactly similar to the dry negative collodion process, that a detailed notice thereof is hardly necessary in the present article, which will be confined exclusively to the means of obtaining positive proofs on paper.

Regarding, then, the negative, not so much a picture as the means of producing one, the first thing which presents itself for notice is the paper. This may be either German or French, known in the markets under the respective names of saxe and rive. They are used in the simply salted condition, or more generally in the salted and albuminized state, the purpose of the albuminizing being to prevent the chemicals used in the process from sinking into the paper, whereby the delicate details of the negative would become defective on the surface. The process is briefly as follows: float the paper on the salting bath from one to five minutes; drain for one minute; hang up to dry. Float the paper on the exciting bath from five to ten minutes, according to its strength; drain, and hang up to dry. Expose in a pressure-frame under a negative. The necessary depth of impression being obtained (a point only to be determined by experience), wash the print in common water. Some operators at this stage immerse the print in a bath containing one per cent. of ammonia for two or three minutes. This is by no means absolutely necessary; should it, however, be done, it should be afterward washed in water for five or ten minutes; after which it is immersed in the toning bath from one to ten minutes, or until the desired *tone* be obtained; it is then washed in several changes of water, preparatory to immersion in the fixing bath. This last operation occupies from fifteen to thirty minutes, according to the strength of the fixing solution, and the depth to which the printing has been carried. The print is then copiously washed in *many* changes of water, and hung up to dry.

The *baths* referred to above are composed as follows: *salting bath*, water, one ounce; albumen, 4 ounces; good common salt, 48 grains. *Exciting bath*, nitrate of silver, 240 grains; water, 4 ounces; glacial acetic acid, half a dram. *Toning bath*, chloride of gold, 4 grains; water, 24 ounces; carbonate soda, 100 grains. *Fixing bath*, hyposulphite of soda, 4 ounces; water, 1 pint.

Printing in carbon, lamp-black, or other impalpable powder, which doubts as to the stability of silver prints had long made a *desideratum*, has recently been brought to a considerable degree of perfection. It is based on the discovery by Mungo Ponton, that a mixture of gelatine and bichromate of potass is rendered insoluble by the action of light, and on the experiments of Poitevin, Fargier and Blair. There are three typical processes —the *autotype*, *Woodburytype*, and *lichtdruck*. The *autotype* consists in coating a sheet of prepared paper with a mixture of gelatine, bichromate of potass, and carbon, and when dry, exposing it under a negative. On removal from the printing frame, the pigment is moistened with water, and laid, prepared side down, on a support of glass, zinc, or shellac-coated paper, to which a gentle pressure makes it adhere. The paper is then removed, and the print is developed by immersion in warm water, which dissolves the unaltered gelatine, but cannot touch the parts rendered insoluble by the light which has passed through the negative. The developed print is again transferred to paper, when the high lights are found to consist of those parts where the gelatine has been completely dissolved, the middle tints of the parts less soluble, and the shadows of the parts quite insoluble.—In the *Woodburytype*, a bichromated gelatine film, but without carbon, is prepared, exposed, and developed in a somewhat similar way, but dried without being transferred to paper, the result being a sheet of gelatine with a picture in *relief*. This is laid on a plate of soft metal, and covered with a plate of steel, and the whole subjected to the action of a hydraulic press, by which the soft metal takes the impression of the gelatine film. In printing from the plate so produced, an ink, consisting of carbon and gelatine, is poured on the center, the paper is laid on the ink, and the pressure of a suitable press applied, whereby the ink is squeezed into the shadows and half-tones, and the high lights are left clean, the result being a really fine print. Glass may be used instead of paper, with very fine results.—*Lichtdruck* is a method of printing photographs in an ordinary lithographic press, with printer's ink, from gelatine films prepared on the same principle as the *Woodbury* tissue, except that the soluble gelatine is not washed away. The film is attached to a thick plate of glass fixed in the press, and when sponged over, the soluble parts absorb water, and so are prevented from taking on ink, while the insoluble portions remain dry, and the ink adheres to them.

POSITIVISM, a scheme of philosophy founded by Auguste Comte, which limits speculation and knowledge to observed facts, with their constant antecedents, accompaniments, and consequences. It ignores all laws except those of manifest association; and excludes causes and effects, supernatural and spiritual agencies, hidden forces and immaterial essences. It reduces the intelligible universe to mere phenomena, refusing to search into the essential constitution of things, or to advance beyond the sphere of strictly scientific analysis and construction. It claims thus to pursue purely inductive science, and regards all beyond as not only uncertain but delusive. The system is thus defined by Frederick Harrison, one of its eminent advocates: "By the positive method of thought we mean that which would base life and conduct, as well as knowledge, upon evidence that can be referred to logical canons of *proof*, which would place all that occupies man in a homogeneous system of *law*. On the other hand it turns aside from *hypotheses* that cannot be tested by any logical canon familiar to science; and from ideal standards which profess to transcend the field of law. We say, life and conduct shall stand for us wholly on a basis of law, and must rest entirely in that region of science (not physical, but moral and social science) where we are free to use our intelligence in methods which the intellect can analyze." To this may be added the original description of the system by Comte himself: "In fine, in the positive state the human mind, recognizing the impossibility of attaining absolute notions, renounces the investigation of the origin and destination of the universe, and inquiry into the intrinsic causes of phenomena, and attaches itself instead solely to the discovery, by judicious combination of reasoning and observation, of their invariable relations of succession and resemblance. The explication of facts thus reduced to its real terms is, thenceforward, nothing more than the connection established between the diverse phenomena and certain general facts whose number is constantly diminished by the progress of science." Notwithstanding the apparent originality imparted to the system by its modern dress and forms of thought, acute thinkers detect in it a revival of the old dogma that man is the measure of the universe. The ancient connection between the macrocosm and microcosm is repeated by limiting the intelligible universe to the image that the human mind can obtain by reasoning on the phenomena that the bodily senses observe. The boundless universe, and the mind, heart, and duty of man, are narrowed down to the mere knowledge of visible things. "The combined activity of the human powers, organized around the highest of them," it calls "the soul." Sir David Brewster criticises it as "an extravagant transformation of that rational empiricism which professes to take experience for its basis, resulting from insisting on the prerogatives of experience in reference to external phenomena, and ignoring them in relation to the movements and tendencies of our intellectual nature." See COMTE, *ante.*

POSSÉ COMITATUS means the whole force of the county, consisting of knights and men above the age of 15, with constables, who attend the orders of the sheriff to assist in enforcing process or quelling riots. Justices of the peace can also, if apprehensive of an organized resistance, command the services of the posse comitatus, and it is the sheriff's duty to raise the necessary number of men. But practically, in modern times, constables and special constables are all the assistance given or required.

POSSESSION OF PROPERTY, in point of law, is the most intimate relation that can subsist between the owner and his property. Strictly speaking, the idea of property consists merely of a certain relation between a human being and a portion of external nature, whereby he appropriates to himself all the ordinary uses of which such external nature is capable. If it is land, he reaps the fruits, and excludes all other persons from interfering with his operations; if it is a chattel, he keeps it under his exclusive control. Possession, therefore, is nothing but the legal result of the relation of property. Possession, though originally constituting the whole substance of property, has, as civilization advanced, become a separable part of it; and while the radical right is now the ownership, the possession is viewed as an incident of such ownership. It is now not only separable but salable, and constitutes the foundation of the contract between landlord and tenant, whereby the owner, by way of a lease, sells for a limited period the exclusive use, otherwise called the possession. So long, therefore, as an owner exists, he has, as a necessary consequence, the right, more or less immediately and directly, to the possession of property. When all record of ownership is lost, then the law permits a resort to first principles, and allows any person who has been in possession for a limited time to retain it, and so ultimately acquire the ownership. If the possession is suddenly or wrongfully interfered with, the usual remedy, in England, to recover possession of real property, such as land or houses, is an action of ejectment; if the property is a chattel, it is an action of trover or detinue. But the possession may be recovered also by other modes. See also OWNERSHIP and LOST PROPERTY.

POSSET, a dietetic preparation, made by curdling milk with some acidulous liquor, such as wine, ale, or vinegar. White wine or sherry is usually preferred, but sometimes old ale is used. The milk is boiled; and whilst it is still on the fire, the acidulous matter is added: if sherry, about a wine-glassful and a half to the pint of new milk is the proportion; or twice the quantity if ale. A teaspoonful of vinegar or of lemon-juice is sometimes used instead; one or two tablespoonfuls of treacle are added, to sweeten. Taken at bedtime, it is used for colds and coughs.

POST, ALFRED CHARLES, LL.D.; b. New York, 1806; graduated at Columbia college in 1822; appointed in 1851 professor of surgery in the medical department of the university of New York, and attending and consulting surgeon to various hospitals and institutions in New York, which positions he retains.

POST, TRUMAN MARCELLUS, D.D., b. Vt., 1810; graduated at Middlebury college in 1829; was principal of an academy at Castleton, Vt., 1829–30; tutor at Middlebury college 1830–32; settled at Jacksonville, Ill., and admitted to the bar in 1833; became professor of languages in Illinois college, and afterward, of history; was ordained and installed pastor of the Congregational church of Jacksonville in 1840; in 1847 became pastor of the Third Presbyterian church at St. Louis, and in 1851, of the First Congregational church of that city, where he remains. He has officiated as professor of history in the Washington university of St. Louis, of church history in the theological seminary at Chicago, and lecturer on Congregationalism in the seminary at Andover. He is the author of *The Skeptical Era in Modern History*, has published sermons, pamphlets, and addresses, and contributed to various periodicals. All his work shows scholarship, spiritual fervor, and intellectual breadth.

POST, WRIGHT, 1766–1828; b. Long Island, N. Y.; studied medicine for six years in New York and London; practiced medicine in New York in 1786; became in 1792 professor of surgery, and afterward of anatomy and physiology in Columbia college; visited the celebrated schools of Europe, and returned in 1793 with a splendid anatomical cabinet; became in 1813 professor of anatomy in the college of physicians and surgeons, and its president 1821–26. He was for 30 years consulting physician of the New York hospital, and a member of the prominent literary societies of the city.

POSTAL SERVICE. See POST-OFFICE.

POST-CAPTAIN, an obsolete title applied to captains in the royal navy: it has been disused for many years. See CAPTAIN.

POSTE RESTANTE (Fr., to remain at the post-office till called for), a usual mode of addressing letters to persons who are merely traveling in, or passing through, a country in which they have no fixed residence. English travelers on the continent have very generally their letters so addressed to some town through which they expect to pass. The *poste-restante* office is open at certain hours, and the letters are given out when called for, production of a card, passport, or other evidence of identity being sometimes required. Letters unclaimed for a certain time are opened, and either destroyed or returned to their writer. There is a *poste-restante* office in London, under stringent regulations as to the conditions on which letters are given out. If the applicant for a letter be a British subject, or subject of a state not issuing passports, he must state the place from which he expects letters, and he, or the messenger who applies for him, must be provided with some proof of identity. If he be the subject of a country which issues passports, his passport must be produced. In the provincial post-offices of Great Britain, commercial travelers, tourists, and persons without a settled residence may have their letters addressed *poste restante*, and they are kept at the post-office till called for; but residents are not allowed to have their letters so addressed, and the post-office authorities have orders to deliver them. In the British post-office, letters addressed *poste restante* are kept one month, and then returned to the writer through the dead-letter office.

POSTERN, in fortification, is a small doorway communicating usually through the flank of a bastion between the fort and the ditch. Its object is to afford unseen egress to troops marched out to relieve sentries on the external works, to make sallies, etc. The postern is often called the "sally-port."

POSTHUMOUS CHILD, one born after the father's death, or taken from the body of the mother after death. Such a child is regarded by the law as already born at the time of the parent's death, and when the father has made no provision in his will for the posthumous child, the will is so far revoked as to allow it to take the property or such portion as it would have been entitled to if it had been born before the father's death.

POSTING, the forwarding of passengers from place to place by means of relays of horses The application of the same words—post and postmaster—to the transmission of letters and to the stations where post-horses are kept, is, both on the continent of Europe and in Britain, a source of ambiguity. Posting was long in Britain, as it is yet in most parts of the continent, a government monopoly. A statute of Edward VI. fixed the charges of posting at 1d. per mile in 1548. The post-office act of 1656 confirmed the monopoly of furnished post-horses for travelers in favor of the postmaster and his deputies; for a long time past, however, posting has been in the hands of private individuals. Post-chaises were first used in France, and introduced into England in the early part of last century. The payment is estimated per mile for each pair of horses, without regard to the number of persons conveyed; and a second pair of horses is charged at the same rate as the first.

Over the continent generally posting is managed by the state, which retains the monopoly of supplying post-horses, and usually of forwarding the mails and diligences. The prices are fixed by government, as well as the number of horses that may be employed, which is regulated by the weight and number of persons conveyed.

POSTIQUE, an ornament in sculpture, marble, etc., applied or added after the work is otherwise finished.

POST-NUPTIAL CONTRACT means, in Scotch law, an agreement, or, as it is called in England, a settlement, made between husband and wife after the marriage has taken place, with a view to affect the property of the parties, and generally to make provision for the wife and children. As a general rule, a post-nuptial settlement is not so effectual as an ante-nuptial settlement in securing the rights of a wife, because in the former case the marriage is considered a valuable consideration in point of law, and puts it on the footing of a sale. Nevertheless, if the husband is quite solvent, he and his future creditors will be bound by the provisions of a post-nuptial contract. See HUSBAND AND WIFE.

POST-OBIT is a bond or security given by heirs and others entitled to reversionary interests, whereby, in consideration of a sum of money presently advanced, the debtor binds himself to pay a much larger sum after the death of some person, or of himself. Whenever, as is not unusual, the payment is uncertain, and depends on the obliger outliving somebody else, very high interest is required, or rather a very much larger sum is agreed to be repaid than what is advanced. These are generally usurious bargains; but the obligee or creditor can enforce payment of the full amount; though, if there is a gross case of inadequacy in the proportions amounting to fraud, a court of equity will interfere.

POST-OFFICE, a place for the reception of letters, and the management of the various departments connected with their dispatch and conveyance. The name originated in the posts (from Lat. *positum*, placed, fixed) placed at intervals along the roads of the Roman empire, where couriers were kept in readiness to bear dispatches and intelligence; but the posts of ancient times were never used for the conveyance of private correspondence. The first letter-post seems to have been established in the Hanse towns in the early part of the 13th century. A line of letter-posts followed, connecting Austria with Lombardy, in the reign of the emperor Maximilian, which are said to have been organized by the princes of Thurn and Taxis; and the representatives of the same house established another line of posts from Vienna to Brussels, connecting the most distant parts of the dominions of Charles V. This family continue to the present day to hold certain rights with regard to the German postal system, their posts being entirely distinct from those established by the crown, and sometimes in rivalry to them.

In England, in early times, both public and private letters were sent by messengers, who, in the reign of Henry III., wore the royal livery. They had to provide themselves with horses until the reign of Edward I., when posts were established where horses were to be had for hire. Edward IV., when engaged in war with Scotland, had dispatches conveyed to his camp with great speed by means of a system of relays of horses, which, however, fell into disuse on the restoration of peace. Camden mentions the office of "Master of the Postes" as existing in 1581, but the duties of that officer were probably connected exclusively with the supply of post-horses. The posts were meant for the conveyance of government dispatches alone, and it was only by degrees that permission was extended to private individuals to make use of them. A foreign post for the conveyance of letters between London and the continent seems to have been established by foreign merchants in the 15th c.; and certain disputes which arose between the Flemings and Italians, regarding the right of appointing a postmaster, and were referred to the privy-council, led to the institution of a "chief-postmaster," who should have charge both of the English and the foreign post. Thomas Randolph was the first chief postmaster of England. The first proper postal communication for private letters in England came into operation 100 years after the institution of the foreign post. The increased intercourse between the English and Scottish capitals, brought about by king James's accession, led to a great improvement in the system of horse posts, but their services were still confined to the conveyance of government dispatches. That king, however, instituted a foreign post for letters going abroad from England, and conferred the office of postmaster of England for foreign parts on "Mathewe de Quester the elder, and Mathewe de Quester the younger." This appointment was considered by lord Stanhope, the English chief-postmaster, to interfere with his functions, and a dispute and law-plea between the heads of the two establishments was settled in 1632, after Charles I. had become king, by the retirement of lord Stanhope, and an assignment of their office by the De Questers, under royal sanction, to William Frizell and Thomas Witherings. In 1635 Witherings was authorized to run a post night and day between London and Edinburgh, "to go thither and back again in six days." Eight main postal lines throughout England were at the same time instituted, and the post was allowed to carry inland letters. Two years later, a monopoly of letter-carrying was established, which has been preserved in all the subsequent regulations of the post-office. The rates of postage were 2d. for a single letter for a distance less than 80 m., 4d. up to 140 m., 6d. for any longer distance in England, and 8d. to any place in Scotland. An attempt, in 1649, by the common council of London to set up a rival post-office for inland letters, was suppressed by the house of commons. A practice of farming the post-office revenues, which began in 1650, continued, as regards some of the by-posts, till the close of last century.

An important post-office statute was passed under the protectorate in 1656, and re-enacted by 12 Car. II. c. 35. It ruled that there should be one general post-office and one postmaster-general for England, who was to have the horsing of all through posts and persons riding post. A tariff was established for letters, English, Scotch, Irish, and foreign, and the only non-governmental posts allowed to continue were those of the universities and the Cinque ports.

In 1685 a penny-post was set up for the conveyance of letters and parcels between different parts of London and its suburbs. It was a private speculation, originating with one Robert Murray, an upholsterer, and assigned by him to Mr. William Docwray. When its success became apparent, it was complained of by the duke of York, on whom the post-office revenues had been settled, as an encroachment on his rights; a decision of the court of king's bench adjudged it to be a part of the royal establishment, and it was thereupon annexed to the crown. In this way began the London district-post, which was improved and made a twopenny-post in 1801, and continued as a separate establishment from the general post down to 1854.

The first legislative enactment for a Scottish post-office was passed in 1695, prior to which time the posts out of Edinburgh had been very few and irregular. About 1700 the posts between the capitals were so frequently robbed near the borders, that acts were passed both by the parliament of England and that of Scotland, making robbery of the post punishable with death and confiscation. The post-office of Ireland is of later date than that of Scotland. In the time of Charles I., packets between Dublin and Chester, and between Milford-Haven and Waterford, conveyed government dispatches; and after the restoration, the rate of letter-postage between London and Dublin was fixed at 6d.

Act 3 Anne, c. 10, repealed the former post-office statutes, and put the establishment on a fresh basis. A general post-office was instituted in London for the whole British dominions, with chief offices in Edinburgh, Dublin, New York, and other places in the American colonies, and one in the Leeward islands. The whole was placed under the control of an officer appointed under the great seal, called the postmaster-general, who was empowered to appoint deputies for the chief offices. Rates higher than those formerly charged were settled for places in the British dominions, and also for letters to foreign parts. A survey of post roads was ordered for the ascertainment of distances. Letters brought from abroad by private ships were ordered to be handed over to the deputy-postmasters of the ports, who were to pay the master a penny for each letter. A complete reconstruction of the cross-post system was effected in 1720, by Ralph Allen, postmaster of Bath, to whom the lords of the treasury granted a lease of the cross-posts for life: at his death they came under the control of the postmaster general. The rates of postage were further raised by act 1 Geo. III. c. 25, which also gives permission for the establishment of penny posts in other towns, as in London. The Edinburgh penny-post was instituted in 1766, by one Peter Williamson, a native of Aberdeen, whom the authorities induced to take a pension for the good-will of the concern, and merged it in the general establishment.

Mail-coaches owe their origin to Mr. John Palmer, manager of the Bath and Bristol theaters, who, in 1783, submitted to Mr. Pitt a scheme for the substitution of coaches, protected by armed guards, for the boys on horseback, who till then conveyed the mail. After much opposition from the post-office authorities, his plan was adopted, and Mr. Palmer, installed at the post-office as controller-general, succeeded in perfecting his system, greatly increasing the punctuality, speed, and security of the post, and adding largely to the post-office revenue.

In 1837 a plan of post-office reform was suggested by Mr. (afterward sir) Rowland Hill, the adoption of which has not only immensely increased the utility of the post-office, but changed its whole administration. Its principal features were the adoption of a uniform and low rate of postage, a charge by weight, and prepayment. The change met with much opposition from the post-office authorities, but was eventually carried by a majority of 100 in the house of commons, becoming law by 3 and 4 Vic. c. 96. The new system came into full operation on Jan. 10, 1840. Previously to the change, members of parliament had the right of sending their letters free, but this privilege of franking was entirely abolished. A penny was adopted as the uniform rate for every inland letter not above half an ounce. Facilities for prepayment were afforded by the introduction of postage-stamps, and double postage was levied on letters not prepaid. Arrangements were made for the registration of letters; and the money-order office, by a reduction of the commission charged for orders, became available to an extent which it had never been before. As far back as 1792 a money-order office had been established as a medium for sailors and soldiers to transmit their savings, and its benefit had afterward been extended to the general public; but the commission charged had been so high that it was only employed to a very limited extent. The immediate result of the changes introduced in 1840 was an enormous increase in the amount of correspondence, arising in part from the cessation of the illicit traffic in letters, which had so largely prevailed before; but for some years there was a deficit in the post-office revenue. The reduction of postage-rates was, however, a reduction of taxation, and if the exchequer lost revenue from one source, it gained it in other ways.

With the development of the railway system came the carriage of letters by train instead of by mail-coaches; and one novelty which arose out of this change was the adoption of traveling post-offices, forming part of the mail-train, where letters are arranged during transit, and which sometimes receive and drop the letter-bags while the train is going at full speed. The conveyance of the mails by railroad added greatly to the expenses of the post-office establishment; but, nevertheless, the former gross revenue of the post-office was exceeded in 1851, and the net revenue in 1863. According to the annual report of the postmaster-general for 1876, there are 896 head post-offices in the United Kingdom, 12,551 branch offices or receiving-houses, and about 10,724 road or pillar letter-boxes; making more than 24,000 receptacles for letters—at least 19,000 more than existed under the former system. Above 1058 millions of letters passed through the post-office in 1878—more than twice as many as in 1861, and thirteen times as many as in 1839, the last year of the dear postage. In 1878 the gross revenue of the post-office, exclusive of that yielded by the telegraphs, was £6,047,312; the expenditure, also excluding the telegraphic service, £3,990,620; the net revenue, £2,052,793. The number of money orders transmitted within the United Kingdom, in 1877, was 18,890,692; the amount of money transmitted being £28,474,607.

The postal service of the three kingdoms is now under the immediate control of the postmaster-general, assisted by the general secretary of the post-office in London. There are also chief officers in Edinburgh and Dublin, with secretarial and other departmental staffs. The postmaster-general is a member of the privy council, and sometimes a cabinet minister. He has a salary of £2,500, and is the only officer connected with the department who leaves office on a change of government. The secretary is his responsible adviser, and has a salary of £2,000. The receiver and accountant-general keeps account of the money received by each department, receiving remittances from branch and provincial offices, and taking charge of the payment of all salaries, pensions, and items of current expenditure. The surveyors are the connecting link between the metropolitan and provincial officers, each postmaster, with some exceptions, being under the superintendence of the surveyor of his district. In 1878 the staff of officers employed in the post-office, including those engaged in telegraph work, was 45,947; of this number, 11,473 were engaged solely in telegraph work, and 10,665 were employed in London alone.

Act 24 Vict. c. 19 instituted a system of savings-banks in connection with the post-office. This department keeps a separate account for every depositor, acknowledges the receipt of every deposit, and on the requisite notice being furnished, sends out warrants authorizing postmasters to pay withdrawals. The rate of interest payable to depositors is 2½ per cent, calculated on complete pounds and complete months, being a halfpenny per pound per month. Each depositor receives a savings-bank book, which is sent by him yearly for examination at the head-office, and the accruing interest is calculated and allowed. The number of depositors at the end of 1878 was 1,892,176; the sum at their credit, £30,411,563; and the accrued interest since 1861, £5,937,033.

Act 27 and 28 Vict. c. 43 empowers the postmaster-general to insure the lives of applicants for not less than £20 or more than £100, and also to grant immediate or deferred annuities on the lives of applicants aged ten or upward. See POST-OFFICE INSURANCE. Licenses are issued by the post-office on behalf of the board of inland revenue.

Half-penny post-cards were introduced in 1870, and in the first year 75 millions were used. The number delivered in 1878 reached 102 millions.

Act 31 and 32 Vict. c. 100 empowered the post-office to acquire the existing electric telegraphs; and the telegraphic communication of the country is now in the hands of the post-office. Above 22 millions of telegraphic messages were sent in the year ending Mar. 31, 1878. Gross revenue, £1,333,542; working expenses, £1,164,131; net revenue, £169,411.

The home and foreign mail-packet service was, in the 17th and 18th centuries, in the hands of the post-office authorities, but was removed to the board of admiralty, under whose control it remained till 1860, when it was again restored to the post-office. Steam-vessels were first used for conveying the mail in 1821; and in 1833, mail-contracts were introduced, the first being with the Mona Steam company to run steamers from Liverpool to Douglas in the Isle of Man. Of the home mail-packet contracts, the most important are those with the City of Dublin Steam-packet company for conveying the Irish mails between Holyhead and Kingstown. The principal foreign contracts are for the Indian and Chinese mails, entered into with the Peninsular and Oriental Steam-navigation company, the mails to North and South America, the West Indies, the Australian colonies, and the Cape.

The post-office statute of queen Ann contains a prohibition, repeated in subsequent acts, for any person employed in the post-office to open or detain a letter, except under a warrant from one of the principal secretaries of state. During last century, such warrants were often granted on very trivial pretenses. In 1723 at bishop Atterbury's trial, copies of his letters, intercepted at the post-office, were produced in evidence against him; and in 1735 it appeared that an organization existed, at an immense expense, for the examination of home and foreign correspondence. In 1782 the correspondence of lord Temple, when lord-lieutenant of Ireland, was subjected to a system of post-office espionage. In the beginning of the present century, an improvement took place in this matter, and lord Spencer introduced the custom, in 1806, of recording the dates of all warrants granted for the opening of letters, and the grounds on which they were issued. Since 1822 the warrants have been preserved at the home office; and a house of commons' return in 1853 shows that, in the preceding ten years, only six letters were detained and opened—four in cases of felony, and two that they might be properly returned by those who claimed them. One of these cases of interference with the privacy of correspondence occurred in 1844, when sir James Graham, as home secretary, issued a warrant for opening the letters of Mazzini, and caused certain information contained in them to be conveyed to the Austrian minister, an act which involved the ministry of the day in considerable popular obloquy, and produced a widespread, though very groundless, distrust of the security of the ordinary correspondence of the country. See GRAHAM, SIR JAMES.

The following is a summary of the most important regulations of the British post-office, reference being made for the minute details to the *British Postal Guide:*

Inland Letters.—The rates of postage, prepaid, are 1d. for a letter weighing not more than 1 oz.; 1½d. when the weight is 1 oz. and not above 2 oz.; 2d. 2 oz. and not above 4 oz.; 2½d. 4 oz. and not above 6 oz.; 3d. 6 oz. and not above 8 oz.; 3½d. 8 oz. and not above 10 oz.; 4d. 10 oz. and not above 12 oz. A letter exceeding 12 oz. is charged 1d. per oz.; e.g., for a letter weighing 16 oz. the postage is 16d. A letter posted unpaid is charged double postage. Letters insufficiently stamped are charged double the deficiency on delivery. Redirected letters are charged additional postage at the prepaid rate; and this may either be prepaid, or charged on delivery. Letters for officers, soldiers, or seamen on actual service abroad are redirected without charge. The same privilege extends—with several restrictions—to soldiers' and sailors' letters redirected from any part of the United Kingdom.

No inland letter can be conveyed by post which is more than 1 foot 6 in. in length, 9 in. in width, and 6 in. in depth, unless sent to or from one of the government offices.

Registration.—The registration fee of 2d.—in addition to the ordinary postage—prepaid in stamps, secures careful treatment to any letter, newspaper, or book-packet, and renders its transmission more secure, by enabling it to be traced from its receipt to its delivery. Letters may be registered for a fee of 2d. to any place in the British colonies, and for various rates of charge to different foreign countries. Letters containing coin, if not registered, are treated as if they were, and charged on delivery with a registration fee of eightpence; the same fee is charged on letters marked "Registered" and posted in the usual way instead of being given to a post-office servant. If lost, the contents are only made good to the extent of £2.

Foreign and Colonial Letters.—For the rates payable, reference is made to the *British Postal Guide.* Prepayment must be wholly in stamps. In some cases prepayment is optional; in others, compulsory; and to some countries the whole postage cannot be prepaid. A letter posted unpaid or partially paid, directed to go by a route by which prepayment is compulsory, is returned to the writer, unless there be another route to send it by, by which prepayment is not required. Letters, however, for Australia and New Zealand, if prepaid as much as one rate, are forwarded, charged with the deficient postage and an additional rate. Letters for the Cape or Natal posted unpaid (wholly or in part), in addition to the deficient postage are charged 6d. each. Those for St. Helena and British West Indies, not included in the general postal union, are charged 1s. each in addition to the deficient postage. No letter for any foreign country may be above 2 ft. in length or one foot in width or depth.

Letters to be sent by private ship must be so marked; their postage varies from 2½d. upward for half an ounce, and prepayment is obligatory in some cases, and in others not.

Letters to passengers on board the American or Mediterranean packets must be registered, and must be addressed to the care of the commander of the packet.

The post-office monopoly is applicable to *letters* only, and it does not include letters sent specially by private messenger, or letters concerning goods or merchandise sent to be delivered along with the goods which they concern.

Newspapers.—In 1870 the impressed duty stamp was abolished; and now, any newspaper published at intervals not exceeding seven days, and on a sheet or sheets unstitched, and registered at the general post-office, is transmissible by post within the United Kingdom at a postage of one half-penny for each transmission. The postage must be prepaid, either by an adhesive stamp or by a stamped wrapper. A packet of newspapers is not chargeable at a higher rate than a book packet—namely, one half-penny for every 2 oz. or fraction of 2 oz. The cover, if there is one, must be open at both ends, and such that the packet can be easily removed for examination. There must be no writing outside or inside, except the address of the person to whom the newspaper is sent. Registration for inland circulation includes registration for transmission abroad. Newspapers for foreign countries and the colonies are subject to the same general regutions as for inland circulation, except that they may be published at intervals of 31 days, and printed on sheets stitched together. They must be posted within 8 days from the day of publication.

Parliamentary Proceedings.—The printed proceedings of parliament, with the words "parliamentary proceedings" written or printed on the cover, may circulate throughout the United Kingdom at the rate of one half-penny for every 2 oz. or fraction of 2 oz. Prepayment is optional. Parliamentary notices may be forwarded by post under certain regulations and restrictions, the postage chargeable, and a registration fee of 6d. being payable in stamps.

Book-post.—This branch of the post-office was first established in 1848, and further improved by regulations issued in 1855, '57, and '70. The postage is now one half-penny for every 2 oz. or fraction of that weight. A book-packet may contain books, paper, or parchment, whether plain, or written, or printed upon (provided there be nothing of the nature of a *letter*); maps, prints, etc. (but not in glass frames). *Circulars,* when wholly or in great part printed or lithographed, may also be sent by book-post, singly or in packets. The postage must be prepaid by adhesive stamps, or by a stamped wrapper; if not prepaid the packet is charged double the book-postage; if not sufficiently prepaid it will be charged double the deficiency. If there is a cover it must be open at the ends. No book-packet must exceed 5 lbs. in weight; it must not be over 1 foot 6 in. length by 9 in. in width and 6 in. in depth; nor must it contain anything sealed against inspection. An entry on the first page of the book stating who sends it, or to whom it is given, is allowed. In order to secure the return of book-packets that cannot be delivered, it is recommended to have the names and addresses of the senders written or printed outside. No writing in the way of a letter or communication is allowed; if any such communication be found within a packet the whole will be charged the unpaid letter rate, and forwarded. The book-post has been extended to the colonies and to foreign countries at varying rates.

Colonial and Foreign Pattern and Sample Post.—This post extends to most colonies and foreign countries, at rates corresponding with those for book packets. It is restricted to *bonâ-fide trade patterns or samples of merchandise.* Goods sent for sale, or in execution of an order (however small the quantity may be), or any articles sent by one private party to another which are not actually patterns or samples, are not admissible. The patterns are to be sent in covers open at the ends or sides; but samples of articles which cannot be placed in open covers may be inclosed in transparent bags. Such articles as knives, scissors, etc., may be sent to places abroad, except France and the French colonies, provided they are so packed as to do no damage.

Post cards, bearing a half-penny impressed stamp, are transmissible within the United Kingdom. On the stamped side the address alone is to be written. On the other side any communication may be written or printed. Private cards are, in certain circumstances, allowed to be impressed with a half-penny stamp. Inland post-cards are issued in two qualities, "stout" and "thin," at 8d. and 7d. per dozen respectively. There are also foreign post-cards (price 1d. and 1½d.) for places within the postal union, used also for India, the French colonies, etc., on payment of a small additional charge.

Money Orders.—Inland money orders may be obtained at any of the post-offices of the United Kingdom, on payment of the following commission: For sums under 10s.—2d.; for 10s. and under £2—3d.; for £2 and under £3—4d.; for £3 and under £4—5d.; and so on, up to £9 and under £10—11d.; £10—1s.* Money-orders may now be issued to the colonies, to most European countries, the United States, Egypt, etc., the commission being about three to four times the above rate. In applying for a money order the surname and initial, at least, of one Christian name of the sender, and the name of the person to whom payable, must be given; but the designation of a firm will suffice, and the name of the person to whom the order is payable may be withheld, if it is to be paid through a bank. A money order in the United Kingdom becomes void if not presented for payment before the end of the twelfth calendar month after that in which it was issued. Orders drawn on France or Italy must be paid within three months. As the lower rates for inland money orders entail a loss on each transaction, a parliamentary committee in 1877 recommended a revision of the scale, and the issue of "postal notes" for small fixed sums.

Any person with a fixed residence may have a private box at the post-office on paying an appointed fee; but in no other case can a resident have his letters addressed to the post-office. See POSTE RESTANTE.

Letters containing anything liable to injure the contents of the mail-bag are not allowed to be sent by post. This comprehends glass in any form, vessels containing liquids, meat, fruit, explosives, sharp instruments, etc.

Telegrams.—The charge for the transmission of messages by telegraph throughout the United Kingdom is 1s. for the first twenty words, and 3d. for each additional five words, or part of five words; the charge for five words or less to the Scilly Isles is 2s. 6d., plus the ordinary inland rate; each additional word being charged 6d.

The Universal Postal Union.—In Oct., 1874, a conference at Berne resulted in the establishment of the "general postal union," embracing all the European countries, with Egypt and the United States, and resulting in a great simplification of international postal arrangements. This was followed in June, 1878, by the treaty of Paris, signed or subsequently adhered to by all the parties to the former treaty, with the addition of British India, the colonies of France, Spain, Holland, and Portugal, various British colonies, Persia, Japan, Liberia, Brazil, Peru, Mexico, etc., the new convention receiving the name of the "universal postal union." Under this important treaty all the consenting nations were declared to be "a single postal territory for the reciprocal exchange of correspondence." Equal rates, weights, and rules are established, and considerable reduction of postage have followed its adoption. Except in the case of lengthy sea transit, a uniform rate of 25 centimes (2½d.) is adopted for a letter of 15 grams (½ oz.); of 10 centimes (1d.) for post cards; of 5 centimes (½d.) for packets of print, etc., of 50 grams (2 oz.); and of 25 centimes (2½d.) for registration in Europe, and 50 centimes (5d.) for registration beyond Europe.—See *Her Majesty's Mails*, by Lewins; the Postmaster-General's Annual Reports; *Almanach de Gotha;* Martin's *Statesman's Year Book*, etc.

POST-OFFICE (*ante*). Before 1689 postal facilities in the American colonies were simply those afforded by personal accommodation among the colonists. Parton's *Life of Franklin* gives the following account: "Letters arriving from beyond the sea were usually delivered on board the ship into the hands of the persons to whom they were addressed, every family sending a member on board for the purpose of receiving letters. Letters not called for were taken by the captain to a coffee-house near the wharf, where they lay spread out on a table waiting the coming of their owners. Persons from the adjacent settlements called at the coffee-house, and carried away not only their own letters, but all the letters belonging to people in the neighborhood, which they either delivered in person, or deposited at the house of the minister or magistrate, or some relative of the individual to whom the letter was addressed. Hence the custom grew of depositing at the ship coffee-house letters written in the town and destined to a place in the interior, as well as letters brought from the country and directed to an inhabitant of the town. As the settlements grew in number and magnitude it became usual to leave letters directed to one of them at the inn most frequented by the inhabitants of that settlement. Thus, several years before there was a post-office or a post-rider in the colonies, a rude, slow, unsafe, but neighborly system of letter-delivery had sprung up; and long after the establishment of a post-office, this neighborly method continued to be the main dependence of the people for the transportation of letters for short distances." In 1639 Massachusetts undertook the establishment of a legalized postal system, the general court issuing the following decree: "It is ordered, that notice be given that Richard Fairbanks, his house in Boston, is the place appointed for all letters which are brought from beyond the seas, or are to be sent thither, to be left with him; and he is to take care that they are to be delivered or sent according to the directions; and he is allowed for every letter a penny, and he must answer all miscarriages through his own neglect in this kind." In Virginia the colonial law of 1657 required every planter to provide a messenger to convey the dispatches, as they arrived, to the next plantation, and so on, on pain of forfeiting a hogshead of tobacco for default. In 1672 the government of New York established a monthly mail to Boston, advertising as follows: "Those that be disposed to send letters, are to bring them to the secretary's office, where in a locked box they shall be preserved till the messenger alls for them; all persons paying the post before the bagg be sealed up." Thirty years ter the *Boston News Letter* published the following order, showing that this monthly post was then changed to a fortnightly one: "By order of the postmaster-general of North America. These are to give notice, that on Monday night the 6th of December, the Western Post between Boston and New York sets out once a fortnight, the three winter months of December, January, and February, and to go alternately from Boston to Saybrook and Hartford, to exchange the mail of letters with the New York Ryder the first turn for Saybrook, to meet the New York Ryder on Saturday night, the 11th currant; and the second turn he sets out at Boston on Monday night the 20th currant, to meet the New York Ryder at Hartford, on Saturday night the 25th currant, to exchange mails; and all persons who send letters from Boston to Connecticut from and after the 13th instant, are hereby notified first to pay the postage on the same." In 1673 the general court of Massachusetts fixed the payment of messengers with the mails at threepence a mile; and in 1677 the same authority appointed "Mr. John Hayward, the Scrivener," to receive and distribute foreign letters on their arrival in Boston. Three years later this same John Hayward, or Haywood, was appointed postmaster for the whole colony. In July, 1683, William Penn issued an order for the establishment of a post-office in Pennsylvania. There was then a weekly mail from Philadelphia to Maryland, the postage being 6d. for each letter. In New Hampshire a post-office was established by the colony in 1693. In Maine, previous to the revolution, the mail to Portland from the west arrived but once a week, and was very irregular. It was not until about 1760 that a weekly mail was established further east than Portsmouth, N. H.; before that time it was sent only when a sufficient number of letters had collected to pay expenses. The first attempt to systematize and regulate postal communication in the colonies, on the part of the British government, was made by act of parliament in 1660. In 1692 the colony of Virginia passed an act which sets forth the fact that one Thomas Neale had been empowered, by letters-patent from William and Mary, to take charge of the postal business of the colonies, and which accepted this appointment for that colony; and in the following year the legislature of the province of New Hampshire passed an act also recognizing the official authority of the same person. The charges for postage were: "To and from Philadelphia, by the eastern part of New England beyond Boston, nineteen pence. To and from Philadelphia to Lewis (or Lewiston, Del.), Maryland, and Virginia, ninepence. To and from every place within 80 m. of Philadelphia, fourpence half-penny." To or from Philadelphia to Connecticut the charge was ninepence; Rhode Island, twelve pence; and Boston, fifteen pence. The office of postmaster-general for America was created in 1704. Until after 1704 there was no regular post further east than Boston, or further west than Philadelphia. Shortly after this date stage-coaches were established between Boston and New York, and Boston and Philadelphia; but no post-office was established in Virginia until 1732, nor did any postal revenue accrue to Great Britain from the colonies until 1753. In 1710 a general post-office was established in London for all the British dominions under one director called a postmaster-general, who had letter-offices at Edinburgh, Dublin, New York, and other convenient places; the deputy postmaster-general for the colonies was to reside in New York. Under the reign of queen Anne, an act of parliament established the rates of postage for the colonies, and for forty years after this period there was very little perceptible improvement in the postal service. The post-roads were generally in bad condition; the riders, although at this time perfectly loyal, were not trustworthy; and the postmasters are represented as not having been much better. This is shown, too, by the fact that Andrew Bradford, who was postmaster of Philadelphia, and who printed the *Mercury*, used his power to keep Benjamin Franklin's paper, the *Pennsylvania Gazette*, out of the mails, in order that his own paper might obtain the most business.

No man in America was so identified with the interests of the colonial post-office as Benjamin Franklin. In 1737 he was appointed postmaster of Philadelphia. In 1753 he received, with William Hunter, a commission as deputy postmaster-general for the colonies. He immediately proceeded to systematize the department, and personally made a tour of inspection, in which he visited every post-office in the country except that of Charleston, S. C. After four years of his rule, the post-office yielded the salary of the postmasters, and a small revenue besides, and in 1774 a clear annual revenue of £3,000 to Great Britain. In 1753 the delivery of letters by the penny-post was begun, and also the practice of advertising letters remaining in the office in Philadelphia. In 1774 Franklin became obnoxious to the British government, on account of his connection with the petition for the removal of governor Hutchinson from Massachusetts, and on January 31st of that year he was dismissed from the deputy postmaster-generalship. By this time the patriotic movement which concluded in the revolution was in full tide, and so great was the feeling caused by Franklin's dismissal, that private arrangements were made for carrying letters, and after 1774 the American post-office never again contributed a farthing to the British treasury. In fact, in 1775 the colonies combined to establish their own post-offices and to pay the necessary officials; the congress of the confederation appointing a committee to devise a postal system, which went into effect July 26, 1775, when Benjamin Franklin was unanimously appointed postmaster-general, with a salary of $1000 per annum. In 1772, one Hugh Finlay was sent by the British government on a special mission to examine and report upon the post-offices and post-roads of the colonies. He arrived in New York in April, 1773, and proceeded at once to Canada; and beginning his investigation at the last settlement on the banks of the Chaudiere, proceeded thence with Indian guides to the Kennebec river, and examined all the post-offices between "Falmouth and Casco Bay in the Province of Massachusetts, and Savannah in Georgia," beginning Sept. 13, 1773, and ending June 26, 1774. This, which was the last official examination of the colonies made by order of the British government, was duly reported by Finlay; the original MS. notes of his report came by accident into the hands of persons in the United States, and were purchased by the post-office department at Washington, in whose possession they are. During the period of the revolution the postage was paid in currency; but this depreciated so much in value that it was ordered that only specie should be received. In 1792 rates of postage were fixed which remained unaltered for nearly half a century.

In 1845 the entire mail in the United States amounted to 29,000,000 separate articles; in 1875 the number of articles (letters and transient matter) mailed in the city of Boston alone was 39,000,000. The entire expenditures of the post-office department from 1783 to 1833 amounted to $34,700,000; revenue, $36,400,000. During the year 1875 alone, the expenditures were $33,611,000, and the revenue $27,441,000. Up to 1851 the department was self-sustaining; but since that year the expenses have been annually greater than the receipts, except in one year during the war. During the fiscal year ending June 30, 1880, the domestic postal business of the United States was as follows:

Letters	866.593.572
Postal-cards	276,446,716
Newspapers to subscribers and news-agents	695,175,624
Magazines " " " "	53,472,276
Books, circulars, and other printed matter	300,845.480
Articles of merchandise	22,634,456
	2,215,168,124

There were at the same date in the service of the government 5,862 contractors for the transportation of the mails on public routes. There were 1857 special offices, each with a mail-carrier; 11,112 public routes in operation, of which 1118 were railroad routes, aggregating in length 343,888 m.; in annual cost, $18,707.706. The number of employees in the post-office department was 419; postmasters, 42,989; contractors, 5,862; clerks in post-offices, 5,519; letter-carriers, 2,688; railway post-office clerks, 1206; route agents, 1252; mail-route messengers, 338; local agents, 150; special agents, 56; total, 60,479; an increase over 1879 of 8,635 persons. The total expenditures of the department during the fiscal year ending June 30, 1880, were $36.542,803.68; the revenues were $33.315,479.34; deficiency, $3,227,324.34. The amount appropriated for service of the fiscal year 1879–80, including sums appropriated by special acts, was $37,757,089.87; amount expended, $36,101,820.38; leaving an unexpended balance of appropriations of the year of $1,655,269.49.

POSTAGE-STAMPS, STAMPED ENVELOPES, AND POSTAL-CARDS.

Ordinary postage-stamps issued	875,681,970	value,	$22,414,928 00
Newspaper and periodical stamps	1,770,082	"	1,252,903 30
Special stamps for collection of postage due	6,284,500	"	251,836 00
Postal-cards, domestic	269,754,000	"	2,697,540 00
" international	2,796,500	"	55,930 00
Stamped envelopes, plain	98,616,000	"	2,496,238 93
" " special request	76,835,500	"	2,381,355 15
Newspaper wrappers	31,685,500	"	381,787 60
Official postage-stamps	3,351,995	"	140,199 08
" stamped envelopes and wrappers	621,000	"	14,624 40
Aggregating	1,367,897,047	"	$32,087,342 46

During the year 866,593,572 letters were mailed in the United States, of which 3,057,141, or one in every 283, became "dead." Books, pamphlets, magazines, and illustrated newspapers, for which no owner can be found, are distributed among the charitable institutions of Washington. The number of letters and parcels registered during the year was 6,996,513, of which 5,251,118 were domestic letters, 448,656 domestic parcels of third and fourth class matter, 249,722 letters to foreign countries, 8,247 packets of third and fourth-class matter to foreign countries, and 1,038,770 letters and parcels forwarded for the government, and by law exempt from the payment of registry fees. The amount of registry fees collected during the year was $595,774.30. The number of domestic money-orders paid during the year was 7,213,607, amounting in value to $99,516,702.46. The weight of the foreign (out-going) mail during the year was 1,453,601 pounds.

AGGREGATE RESULT OF FREE-DELIVERY SERVICE FOR THE FISCAL YEAR ENDED JUNE 30, 1880.

STATISTICS OF FREE DELIVERY.	Total.	Increase over 1879.	Per cent of Increase.
Number of offices	104	16	18.18
Number of carriers	2,688	329	13.95
Mail letters delivered	243,914,628	29,917,766	13.98
Mailed postal-cards delivered	50,046,891	9,747,431	24.18
Local letters delivered	72,245,029	7,534,845	11.64
Local postal-cards delivered	39,020,614	7,116,140	22.30
Registered letters delivered	1,806,455	396,411	28.11
Newspapers delivered	122,316,076	19,950,706	19.48
Letters collected	280,469,190	27,294,949	10.77
Postal-cards collected	79,280,430	17,149,632	27.61
Newspapers collected	43,022,530	3,159,898	7.93
Whole number of pieces handled	932,121,843	122,207,778	15.09
Pieces handled per carrier	350,499	11,439	3.37
Total cost of service, including pay of special agents	$2,363,693.14	$415,986.53	21.35
Average cost per piece, in mills	2.5	.1	.4
Average cost per carrier	885.28	$61.94	7.52
Average amount of postage on local matter	$3,068,797.14	$256,278.28	9.11

POST-OFFICE, OFFENSES AGAINST. Owing to the conspicuous part which the post-office plays in modern civilization, a small code of laws belongs to it, the substance of which is as follows: Every person employed by the post-office who steals a post-letter, is guilty of felony; and if it contain money or a valuable chattel, the punishment is increased. So whenever letters are stolen by strangers out of the custody of the post-office or its officers. The moment a letter is put into the post-office or delivered to the postmaster, the protection of the statutes commences. Many nice questions have, however, arisen as to the application of the rule to special circumstances, and as to what constitutes an employment by the post-office. Whoever steals, secretes, or destroys printed papers or newspapers sent by post, commits a misdemeanor. So if a letter-carrier delay the delivery willfully; or if an official messenger disclose or intercept a telegraphic message, or violate the rules on that point. Receivers of letters improperly taken or stolen from the post-office, are guilty of felony. By the 1st Vict. c. 33, s. 2, any person conveying otherwise than by post a letter not exempted from the exclusive privilege of the post-master-general, incurs a penalty of £5 for every letter. This exclusive privilege of carrying letters extends to letters only, and not to printed books or newspapers. There are also exceptions to the general rule, that letters can only be sent by the post-office. Thus, one may send a letter by a private friend, and not by the post-office. So letters sent by messenger on purpose on the private affairs of the sender or receiver, commissions and legal writs, merchants' letters sent by vessels or along with goods, are excepted. But no person is authorized to collect and send these excepted letters, though in the legal manner described, for this is doing the work of the post-office. Moreover, there are certain persons expressly prohibited from carrying letters even gratuitously, as common carriers, except the letters relate to goods in their carts or wagons; owners, masters, or commanders of ships, except such letters relate to goods on board; and passengers on board ships. Statutes and rules made thereunder secure the monopoly to the postmaster-general of sending telegraphic messages, and telegrams are put nearly on the footing of letters.

POST-OFFICE INSURANCE is a valuable addition to the many useful services which our postal establishment has been enabled to render within the last few years. Book-post, sample-post, money-orders, and postal savings-banks, all additions to the original letter-post and newspaper-post, have been found to work so satisfactorily, that the legislature has been encouraged to intrust to the same organization a new system of insuring lives and granting annuities—specially intended to foster provident habits among persons whose savings can be but small.

In 1858 an act of parliament made an improvement in the then existing state of insurance law, by facilitating the purchase of government annuities through the medium of the savings-banks; and in 1864 another statute gave a great extension to those portions of the system which had been found to work well, effecting at the same time alterations in those which had exhibited certain defects during eleven years' working. Great facilities are introduced by this act for securing annuities by small payments. Not only may the national debt commissioners employ the trustees of saving-banks to receive and pay the moneys, at a certain rate of remuneration; but the postmaster-general joins in the arrangement, acting as a medium between the public on the one hand and the commissioners on the other. Ample tables and regulations have been printed, for the guidance of the commissioners, the postmaster-general, and the local postmasters throughout the kingdom. On the completion of these tables and regulations in 1865, the practical working of the system began. The tables of the premiums to be charged for life-insurances, for immediate annuities, for deferred annuities, and for deferred monthly allowances, are sold by Messrs. Eyre and Spottiswoode, the government printers, for 5½d. (the cost of the paper and printing); but similar tables are kept for inspection at the local post-offices without charge.

In regard to insurance, distinct from annuities, persons of either sex may insure through the medium of the post-office. The limited ages are from 16 to 60, and the limited sums from £20 to £100. In order to afford every possible facility in the payment of the premium, minute calculations have been made of the exact sum to be paid at each installment, by yearly, quarterly, monthly, or fortnightly payments, and terminable or not at a particular age. In order that there may be some limit to the labor thus placed on the postal authorities, no periodical installment is made smaller than two shillings. No one life can be insured for less than £20 in the whole; but when a life has been insured fot £20, further insurances may be effected on the same life from time to time, until the whole sum for which it is insured amounts to £100. The following is a tabulated example of nine different modes of paying the premium on one particular insurance, to suit the convenience of the insurer. A man in his 30th year may insure £100 to his survivors at his death:

	£	s.	d.
1. By a single payment of....................................	43	3	7
2. By an annual payment for life of..............................	2	6	7
3. By a quarterly " "	0	13	0
4. By a monthly " "	0	4	4
5. By a fortnightly " "	0	2	2
6. By an annual payment, until the insurer reaches 60 years, of.	2	13	10
7. By a quarterly payment, until the insurer reaches 60 years, of.	0	15	0
8. By a monthly payment, until the insurer reaches 60 years, of.	0	5	0
9. By a fortnightly payment, until the insurer reaches 60 years, of.	0	2	6

If an insurer who has duly paid all installments for five years, should desire, or be compelled by circumstances to withdraw from the engagement, a portion of the past premiums will be repaid to him—never less than one-third of the total amount.

In regard to immediate annuities, persons of either sex may purchase annuities of not more than £50, and for lives from 10 years old and upward. The premiums necessarily vary with sex, age, and amount. Thus, a man aged 65 can purchase an immediate annuity of £10, paid half-yearly, for £88 18s. 4d.; whereas, a woman of the same age would have to pay £103 16s. 8d. Two or more small annuities may be purchased for the same life, provided the total amount does not exceed £50. Any two persons may purchase an annuity on their joint lives, with or without continuance of the annuity to the survivor.

Deferred annuities form another element in the scheme. These annuities are very varied in kind, and the amount of premium depends on a great number of conditions—amount of annuity; age and sex of the person; length of term for which the annuity is deferred (that is, the number of years which are to pass before the commencement of the annuity); mode in which the premium is to be paid; and the condition whether or not there is to be any return of purchase-money under certain contingencies. As examples, take the following: A man aged 30 may purchase a deferred annuity of £10, to commence on his reaching the age of 60, and due half-yearly, for one immediate payment of £21 3s. 4d., or an annual payment of £1 8s. 4d.; in the case of a woman, the immediate or total payment would be £32 8s. 4d., and the annual payment £1 17s. 6d. If the person on whose life the annuity is to depend should die before the annuity itself commences, all the premiums paid up to that date may be returned to his or her representatives, provided a contract to this effect is made in the first instance. The premiums are necessarily higher for such a contract. The four sums just mentioned, where past premiums are *not* returnable, would be raised respectively to £40 9s. 2d., £2 0s. 10d., £47 0s. 10d., and £2 7s. 6d., with the returnable clause included.

Many persons in humble life would prefer that the annuities due to them should come more frequently than half-yearly. To suit this class, a system of deferred monthly allowances is established. A man aged 30 may purchase a deferred allowance of £2 7s. 3d. per month, to commence when he reaches the age of 60, by a payment of 8s. per month, until he reaches that age; the same monthly payment by a woman would realize a monthly allowance of £1 16s. 7d. If the returnable clause (above noticed) is included in the contract, the man's monthly allowance would be £1 14s. 2d., and the woman's £1 9s. 4d., for the like payment of 8s. per month. In regard to married couples, a husband and wife may each be insured to the full amount of £100, and may each purchase an annuity of £50, or a monthly allowance of £4 8s. 4d.

Persons whose lives are insured, or to whom annuities are granted, through the post-office, have direct government security for the payment of the money at the proper time; and this is one of the many valuable features of the system. It is not necessary here to describe the exact routine of proceedings for making an insurance or purchasing an annuity; the postmasters whose post-offices have been raised to the rank of insurance offices, are fully instructed in the matter, and will give all requisite information to applicants. We may add, that the *British Postal Guide*, an authorized publication, issued quarterly at 6d., gives a considerable list of tables of premiums payable at various ages for various kinds of insurance and annuity.

POS'TULATE. This word occurs in geometry, and signifies something that is *demanded*, and must be granted before the demonstrations of the science can be wrought out. The postulates of Euclid have reference to certain constructions indispensable to the reasoning. They are these three: "A straight line may be drawn from one point to another;" "A line already drawn may be produced;" and "A circle may be described from a given center, with a given radius." The object of laying down these in the shape of demands, is to fulfill one great condition of demonstrative science, which is, that nothing shall be proceeded on, in the course of the reasoning, without being explicitly stated at the outset. It has been noticed by critics that the three postulates of Euclid do not exhaust the demands actually made in the course of his demonstrations. Thus, in the 4th and 5th propositions, Book I., this postulate is assumed: "Any figure may be removed from place to place without alteration of form, and a plane figure may be turned round on the plane."

The postulate is something different from the axiom. An axiom is a general and fundamental principle, such as no one can deny, and serving as the ultimate foundation (in logic, the major premise) of deductive inferences; as, for example, "Things equal to the same thing are equal to one another." The postulate, in Euclid's sense, is a special accessory to the reasoning, different from the axioms.

But in philosophy, the postulate takes a much wider sweep, and expresses the most fundamental concessions implied in all reasoning, being pre-requisite in order to the establishment of the axioms themselves.

Thus, it is a postulate necessary to reasoning and discussion that a reasoner shall be consistent with himself—that he shall not affirm a thing one minute and deny it the next. The so-called laws of thought—identity, contradiction, and excluded middle—are so many forms of the postulate of consistency. These laws are tantamount to demanding that the same thing shall not be maintained in one form, and denied in another. If we say this room is hot, we must not, at the same time, say that it is not hot. So the ordinary law of the syllogism, "Whatever is true of all members of a class, is true of each," is not so much an axiom as a postulate of consistency; we must be prepared to repeat individually the statements that we have affirmed collectively.

The ultimate premises of all truth and reasoning may be put in the form of postulates, as follows: 1. Present consciousness must be admitted as a ground of certainty. "I am thirsty," "I hear a sound," as facts of present consciousness, are to be held as trustworthy in the highest degree, or as amounting to the highest certainty. 2. But present consciousness is not enough; it must further be conceded that past consciousness is a ground of certainty. Present consciousness does not amount to an experience of value for future purposes, unless taken with past. Now, although a remembrance that is long past is often uncertain, a recent remembrance must be pronounced absolutely certain, not less than a present consciousness. That "I was thirsty a short time ago," I must be certain of, in order to establish the induction, "that water quenches thirst." 3. It must further be conceded, that "What has been in the past, all circumstances holding the same, will be in the future." That a thing has been, does not imply that it will be. We may admit that the sun has risen to-day, and rose yesterday, and so on, and without inconsistency, refuse to admit that it will rise to-morrow. People are generally well enough disposed to treat this as a certainty; indeed, there is a strong natural tendency of the mind to expect that the future will resemble the past, which, when corrected and regulated by experience, constitutes our belief in causation and the uniformity of nature. Still, a blind instinct is no guarantee for truth; and as the assertion of the future is a distinct position, it should be formally assumed in a separate postulate. However often a thing may have happened, we still make a leap, and, so to speak, incur a risk in venturing to predict its future recurrence. Our confidence no doubt increases with repetition, but nothing can obliterate the line between what *has been* and what *is to be*.

These three postulates of experience, coupled with the postulate of consistency, seem adequate as a basis of all the recognized axioms and truths of experience. In other words, the concession of them is enough to commit any one to the reception of all inductive and deductive evidence.

POSTULA'TION (Lat. "an asking"), in canon law, means a presentation or recommendation addressed to the superior, to whom the right of appointment to any dignity belongs, in favor of one who has not a strict title to the appointment. It is one of the forms of proposing to the pope persons nominated, but not, strictly speaking, elected, to a bishopric. It is also used in the case of elections in which the candidate, although regularly chosen by the electors, yet labors under some legal disability which involves the necessity of a dispensation. The presentation of candidates for the episcopacy, as it exists in the Roman Catholic church in Ireland, is called postulation.

POSTURES, the name given to the attitude observed in worship, whether private or public, but especially the latter. They are the natural expressions of the feeling which accompanies or characterizes the particular devotion in which they are employed, and are used by suppliants to man as well as to God. Four postures are found to have been used by the ancient Christians in their prayer—the standing, the kneeling, the bowing or inclined, and the prostrate. Of these the ordinary one was kneeling; but for it was substituted, during the Easter-time and on the Sundays, a standing posture, which was understood to symbolize the resurrection of our Lord. To this usage we find allusions as early as the time of Justin the martyr. In the paintings of the catacombs, and on the ancient enameled glasses found therein, the standing posture in prayer is accompanied by outstretched and upraised hands. The bowing posture was rather a special act of reverence accompanying a particular address or a particular part of an address than a sustained posture. It occurred at frequent intervals in the ancient liturgy, and is still used in the Roman mass as well as (even more profusely) in those of all the various rites, Greek, Syrian, Coptic, Armenian, and Russian. The prostrate posture was the attitude of the deepest humiliation, and was mainly used by the penitents (q.v.), especially in that grade of public penance which was known under the name of "prostration." It is also used still in the solemn ordination of subdeacons, deacons, and priests, as performed in the Roman Catholic church. The question as to the use of particular postures was a subject of much controversy between the Puritans and the church of England; and has recently been revived in the Presbyterian church of Scotland.

POTASH AND PEARL-ASH, in commerce. See POTASSIUM. The chief source of this important article in Britain is Canada, where it is derived from the vast quantities of wood cut down and burned in clearing the forest for culture, and also from the branches of the trees felled for timber. The ashes, mixed with a small quantity of quick-lime, are put into large wooden cisterns, and covered with water. The whole is well stirred up, and allowed to settle; the next day the clear liquor is drawn off and evaporated to dryness in iron pots, whence it is called *potash*. When a sufficient quantity is got to fill a cask of 5 cwt. it is fused at a red heat and poured into the cask. The mass when cold is colored gray externally, but when broken shows a pinkish tint internally. It is very deliquescent, and consequently the casks require to be nearly air-tight. In this state potash contains a large quantity of foreign materials, amounting to about 40 per cent, among which sulphur and carbonaceous matter predominate. This is the crude American potash of commerce. If it is calcined by a reverberatory furnace the sulphur is driven off, and the carbonaceous matter burned out; the carbonic acid, however, combines with the potash, and forms it into a carbonate. To form it into *pearl ash* it is then broken up and dissolved in water in a wooden cistern, having a perforated bottom, covered with straw, through which it filters, and is afterward evaporated in flat-bottomed iron pans. As it approaches dryness it is stirred with irod rods, which break it up into round lumpy masses of a pearly-white color, and in this state it is the pearl-ash of commerce, and contains about 50 per cent of pure potassa. All land-plants yield potash when burned, and many in much greater proportions than the timber-trees of North America; but the circumstances in which the materials are obtained give an advantage to our colonial manufacturers, which hitherto has enabled them to compete with the whole world. The quantity imported annually of "pots" and "pearls," as they are technically called, reaches the value of nearly half a million sterling. See POTASSIUM.

POTASH-WATER. See AERATED WATERS.

POTASSIUM (symb. K, equiv. 39, sp. gr. 0.865) is one of the alkaline metals. The letter K is selected as its symbol, as being the first letter of *kali*, the Arabic word for potash, the letter P being preoccupied as the symbol for phosphorus. The following are the chief characters for this metal. It is of a bluish-white color, and presents a strong metallic luster. At 32° it is brittle, and has a crystalline fracture; at a somewhat higher temperature it is malleable; at 60° it is soft, and of the consistence of wax; at 130° it is completely liquid; and at a red heat it becomes converted into a beautiful green vapor. Its affinity for oxygen is so great that on exposure to the air it immediately becomes covered with a film of oxide. When heated it burns with a violet flame. Its intense affinity for oxygen is well shown by throwing it into water, on which, from its low specific gravity, it floats. The metal abstracts oxygen from the water and forms oxide of potassium (potash); while the liberated hydrogen carries off a small portion of the volatilized potassium, and, taking fire from the heat evolved by the energetic chemical action, burns with a brilliant violet flame. The experiment is a very beautiful one, the burning metal swimming about rapidly on the water, and finally disappearing with an explosion of steam, when the globule of melted potash becomes sufficiently cool to come in contact with the water. At an elevated temperature this metal removes oxygen from almost all bodies into the constitution of which that element enters; and in the laboratory it is often employed to remove any traces of oxygen from hydrocarbons, by distilling the latter with a small quantity of the metal. From the above facts it is obvious that potassium must always be kept in some fluid, such as purified rock-oil or naphtha, which contains no oxygen.

Potassium does not occur in the native state, and can only be obtained by the reduction of its oxide, potash. There are three principal modes of reduction, all of which deserve a brief special notice, either on historical grounds or for their practical value.

1. Davy, in 1807, decomposed a fragment of hydrate of potash, by the current of a strong voltaic battery, into potassium, which separated as globules at the negative pole, and oxygen, which was evolved at the positive pole. This mode of procuring potassium yields only very small quantities, and is expensive; but the experiment was a most important one for the progress of chemistry, as showing for the first time that potash is not, as was previously supposed, a simple body.

2. Stimulated by Davy's discovery, Gay-Lussac and Thenard, in the following year (1808), succeeded in obtaining the metal by purely chemical means in greater abundance, by decomposing potash by means of metallic iron at a white heat. The oxygen of the potash combines with the iron, and the potassium in a gaseous form is condensed in a receiver filled with naphtha, and kept cool.

3. The method now usually adopted consists in the distillation of a mixture of carbonate of potash and charcoal at a white heat, in an iron retort. If proper proportions are taken, the mixture is wholly converted into carbonic oxide and potassium, as is shown in the equation:

$$\overbrace{KO,CO_2}^{\substack{\text{Carbonate}\\ \text{of Potash.}}} + 2C = K + \overbrace{3CO.}^{\substack{\text{Carbonic}\\ \text{Oxide.}}}$$

Potassium forms two compounds with oxygen, viz., a protoxide, KO, which constitutes potash, and is strongly basic, and a teroxide, KO_3, which does not combine with acids, and of which it is unnecessary to say more than that it is a yellowish-brown substance, which is found when the metal is burned in an excess of oxygen gas.

Potash can be procured in the anhydrous form by oxidizing thin slices of the metal in air perfectly free from moisture or carbonic acid. It is white, very deliquescent, and caustic. When moistened with water, it becomes incandescent, and the water cannot be expelled by any degree of heat. A far more important substance is the *hydrate of potash* or *caustic potash* (KO,HO). This is commonly prepared by dissolving carbonate of potash in ten times its weight of water, and gradually adding to the boiling solution a quantity of slaked lime, equal in weight to half the carbonate of potash used. The resulting compounds are carbonate of lime, which falls as a precipitate, and hydrate of potash, which remains in solution; the changes being expressed by the equation:

$$\overbrace{KO,CO_2}^{\substack{\text{Carbonate of}\\ \text{Potash.}}} + \overbrace{CaO,HO}^{\text{Slaked Lime.}} = \overbrace{CaO,CO_2}^{\substack{\text{Carbonate of}\\ \text{Lime.}}} + \overbrace{KO,HO.}^{\substack{\text{Hydrated}\\ \text{Potash.}}}$$

The clear supernatant fluid is removed by decantation, or by means of a syphon, into a clean silver or iron basin, and is rapidly evaporated till it flows tranquilly like oil; it is then either cast into cylinders in metallic molds, or is poured upon a cold slab, and solidifies on cooling. It may also be obtained in acute rhombohedrons, if allowed to crystallize from a hot concentrated solution; the crystals containing four atoms of water. A solution of hydrate of potash being one of our most important chemical reagents, it is very essential that it should be obtained pure. When obtained in the method that has been described, it is apt to be contaminated with carbonic, sulphuric, hydrochloric, and silicic acids, lime, alumina, oxides of iron, etc., any of which substances can be detected by the appropriate tests. Pure caustic potash is, however, perfectly soluble in alcohol, which does not dissolve any of the above-named impurities. Hence, by forming an alcoholic solution of potash, and by evaporating it in a silver vessel till the whole of the alcohol is expelled, we obtain this substance in a state of purity. Hydrated potash, on solidifying after fusion, occurs as a hard, grayish-white, opaque body, with a crystalline fracture, which may be readily again fused into a colorless oily fluid, but which only volatilizes at a very high temperature. It is soluble in about half its weight either of water or of alcohol, and rapidly absorbs both carbonic acid and moisture from the atmosphere. It acts as a powerful caustic, and quickly destroys both animal and vegetable tissues, and hence its solutions can only be filtered through pounded glass or sand. Its affinities are so powerful that few vessels are capable of resisting its influence. Its solution must be preserved in glass bottles, into the composition of which no oxide of lead enters, as it has the property of dissolving this oxide out of the glass. Vessels containing silica (porcelain, earthenware, etc.) are decomposed, and platinum itself is oxidized when heated in contact with it. The principal uses of this substance are thus briefly summed up by prof. Miller: "Potash decomposes the fixed oils, and converts them into soluble soaps; when fused with siliceous minerals, it displaces the bases, and combines with the silica, forming silicate of potash. Potash is extensively employed in the arts: to the soap-boiler and the glass-maker, it is indispensable; when combined with nitric acid, it enters largely into the manufacture of gunpowder; and, in greater or less quantity, it furnishes important aids to a variety of processes employed in the manufactures of the country. In the laboratory, potash is in constant use for absorbing acid gases, such as carbonic acid, and for separating the metallic oxides from solutions of their salts, since, owing to the powerful affinity of the alkali for acids, it readily decomposes the salts of all the metals which produce oxides insoluble in water."—*Elements of Chemistry*, 2d ed., vol. ii. p. 353.

The *salts* which potash forms with acids are for the most part readily soluble in water, and colorless, unless (as, for example, in permanganate of potash) the acid is colored. Most of them are crystallizable, and they all communicate a violet tint, characteristic of potash, to the flame of spirit of wine and to that of the blow-pipe. Many of them occur in the animal and vegetable kingdoms, and the ashes of plants contain them in large quantity. We shall now briefly notice the most important of these salts. *Carbonate of potash* (KO,CO_2) is obtained by burning plants in dry pits, dissolving the ashes in water, evaporating till the sulphates, chlorides, etc., separate in crystals, and then boiling the mother liquid to dryness in iron pots. See POTASH. The quantity of pure carbonate of potash contained in it is liable to great variation, and the process termed *alkalimetry* has been invented, with the view of rapidly determining the amount of this salt, on which the commercial value of the pearl-ash depends. Different plants furnish varying quantities of this salt, and the leaves and young shoots are the parts which furnish it most abundantly. The potash is, of course, obtained by the plants from the soil, which, when capable of supporting vegetable life, always contains that substance; and does not exist in the plants in the form of carbonate, but in union with various organic acids (such as acetic, malic, tartaric, and other acids), which, by incineration, become decomposed into carbonates. The purified carbonate of potash, employed in pharmacy and for chemical purposes, is prepared from the crude salt by adding an equal quantity of cold water, agitating, and filtering. By this means, all the less soluble foreign bodies are got rid of. The solution is then boiled down to a small bulk, and allowed to cool, when the carbonate separates in small crystals, containing 20 per cent of water, and represented by the formula $KO,CO_2 + 2Aq$. Carbonate of potash is extremely deliquescent, and is soluble in less than its own weight of water, but is insoluble in alcohol. It has an acrid, alkaline taste, and its reaction upon test-paper is strongly alkaline. It is a compound of great importance, both as a chemical re-agent, and as entering largely into the preparation of most of the other compounds of potash, and into the manufacture of soap and glass. *Bicarbonate of potash* ($KO,CO_2 + HO, CO_2$) is obtained in white rhombic prisms, by passing a current of carbonic acid gas through a strong solution of carbonate of potash. These crystals are permanent in the air, but are decomposed by heat; water and carbonic acid being evolved, and the simple carbonate left. This salt is much less soluble than the carbonate, requiring four parts of cold water for its solution, which is nearly neutral to test-paper, and has a much milder taste than the preceding salt. It is employed largely in medicine for making effervescing draughts. *Sulphate of potash* (formerly known as *sal-polychrest*) is obtained by dissolving in water the acid residue of bisulphate of potash ($KO,SO_3 + HO.SO_3$) which is left in the retort in the preparation of nitric acid. This solution, on being neutralized with carbonate of potash, furnishes hard transparent crystals of this salt. From its extreme hardness, this salt is used in medicine (as, for example, in Dover's powder), for the purpose of finely comminuting vegetable matters. The *bisulphate of potash*, from which the preceding salt is obtained, is the *sal-enixum* of the older chemists. Except that it is occasionally employed as a flux, it is of no special importance. *Nitrate of potash* has been already described under the head NITER. *Chlorate of potash* ($KO.ClO_5$) occurs in white rhomboidal tablets of a pearly luster. It has a cooling taste like that of niter. It fuses at a gentle heat without decomposition; but on increasing the heat, it gradually gives off all its oxygen, and is converted into chloride of potassium, according to the equation:

$$\begin{array}{ccccc} \text{Chlorate of Potash.} & & \text{Chloride of Potassium.} & & \text{Oxygen.} \\ KO,ClO_5 & = & KCl & + & 6O. \end{array}$$

It is not very soluble, as it requires for its solution 16 parts of cold and 1.7 parts of boiling water. It even exceeds nitrate of potash as an oxidizing agent; and if combustible substances, such as carbon, sulphur, or phosphorus be heated, or forcibly rubbed with it, a detonation or explosion occurs. This salt is employed in the manufacture of lucifer-matches, in certain operations in calico-printing, and for filling the friction-tubes employed for firing cannon, the best mixture for these tubes consisting of 2 parts of this salt, 2 of sulphide of antimony, and 1 of powdered glass. A mixture known as *white gunpowder*, consisting of chlorate of potash, dried ferro-cyanide of potassium, and sugar, has been employed for blasting purposes; but its preparation is accompanied by so much danger that it is seldom used. This salt does not occur as a natural product, but may be obtained by passing a current of chlorine gas through a hot solution of caustic potash; 6 eq. of chlorine combining with 6 eq. of potash to form 5 eq. of chloride of potassium, and 1 eq. of chlorate of potash, according to the equation: $6Cl + 6\,(KO,HO) = 5KCl + KO.ClO_5 + 6HO$. The two salts are easily separated by crystallization, as the chlorate is comparatively insoluble, and the chloride extremely soluble. *Hypochlorite of potash* (KO,ClO) can only be obtained in solution. Under the title of *eau de Javelle*, it is sold as a bleaching agent. It is obtained by passing chlorine gas through a cold dilute solution of carbonate of potash, when chloride of potassium and hypochlorite of potash are formed, from which the chloride may be removed by crystallization. The *phosphates of potash*, formed by the different varieties of phosphoric acid, are sufficiently noticed in the articles PHOSPHATES (in physiology) and PHOSPHORUS. The *silicates of potash* are important compounds in connection with the manufacture of glass; they also enter into the composition of Fuch's *water-glass*, or *soluble glass*, and have been employed by Ransome and others as a coating by which the decay of magnesian and other limestones may be prevented. The *chromate* and *bichromate of potash* are sufficiently noticed in the article CHROMIUM. The haloid salts of potassium may be passed over very briefly. The *chloride of potassium* (KCl) is obtained in large quantity in the preparation of chlorate of potash, or may be procured by burning potassium in chlorine gas, when the result of the brilliant combustion which takes place is this salt. In its general characters, it closely resembles common salt ($NaCl$), except that the former communicates a violet, and the latter a yellow tint to the flame of alcohol. It is a constituent of sea-water, of salt marshes, and of many animal and vegetable fluids and tissues. The *bromide* and *iodide of potassium* are sufficiently noticed in the articles BROMINE and IODINE. *Fluoride of potassium* (KFl) possesses the property of corroding glass. There are no less than five *sulphides of potassium*, commencing with the photo-sulphide (KS), and terminating with the penta-sulphide (KS_5). The latter is the main ingredient in the *hepar sulphuris*, or *liver of sulphur*, used in medicine. It is a brown substance, obtained by fusing, at a temperature not exceeding 482°, 3 eq. of potash and 12 eq. of sulphur, the resulting compounds being 2 eq. of penta-sulphide of potassium ($2KS_5$), and 1 eq. of hyposulphite of potash (KO,S_2O_2). From this mixture, the penta-sulphide may be removed by alcohol, in which it dissolves. The *yellow* and the *red prussiate* (or the *ferro-cyanide* and *ferrid-cyanide*) *of potash* are noticed in the articles FERRO-CYANOGEN and FERRID-CYANOGEN. The *cyanide of potassium* (KCy) may be procured by heating potassium in cyanogen gas, when brilliant combustion occurs, and the resulting product is this salt. It may, however, be more cheaply and easily prepared by Liebig's process, which does not, however, yield it pure, but mixed with cyanate of potash—an impurity which is of no consequence for most of the applications of cyanide of potassium, as, for example, electro-plating and gilding. Eight parts of anhydrous ferro-cyanide of potassium are mixed with three parts of dry carbonate of potash; the mixture is thrown into a red-hot earthen crucible, and kept in fusion till carbonic acid gas ceases to be developed, and the fluid portion of the mass becomes colorless. After a few moments' rest, the clear fused salt is decanted from the heavy black sediment, which consists chiefly of metallic iron in a state of minute division. It has recently been derived from an unexpected source. In some of the iron furnaces where raw coal is used for fuel in the hot-blast, a saline-looking substance is sometimes observed to issue in a fused state from the tweer-holes of the furnace, and to concrete on the outside. Dr. Clark of Aberdeen has shown that this substance is mainly cyanide of potassium. This salt forms colorless deliquescent crystals, very soluble in water. It exhales an odor of hydrocyanic acid, and is said to be as poisonous as that acid. Its great deoxidizing power at a high temperature renders it a valuable agent in many of the finer operations of metallurgy.

The following are the ordinary tests for the potassium compounds: 1. Solution of tartaric acid added in excess to a moderately strong solution of a potassium salt, gives after some time a white crystalline precipitate of cream-of-tartar. See TARTARIC ACID. The result is hastened by stirring or shaking. 2. Solution of bichloride of platinum gives a crystalline yellow precipitate, which is a double salt of bichloride of platinum and chloride of potassium. If not previously acid, the mixture to be tested should be acidulated with hydrochloric acid. See PLATINUM. 3. The violet tint occurring in the presence of potassium in the outer flame of the blow-pipe, or in the flame of spirit, has been already noticed. 4. The spectrum of a flame containing potassium exhibits a characteristic bright line at the extreme limit of the red, and another one at the opposite violet limit of the spectrum. See SPECTRUM ANALYSIS.

The British Pharmacopœia contains the following preparations of this metal: *Caustic potash*, or *hydrate of potash* (KO,HO), which occurs in hard white pencils. From its being fused before being poured into the molds which give it the form of pencils, it is often termed *potassa fusa*. From its power of dissolving the animal tissues, it is sometimes used as a caustic, although its great deliquescence renders it somewhat difficult to localize its action to the desired spot. In bites of venomous serpents, mad dogs, etc., it may be applied with advantage, and it is useful in destroying warts and fungoid growths of various kinds. It can be employed with greater safety than the lancet in opening certain abscesses, especially those of the liver. *Solution of potash*, commonly known as *liquor potassæ*, is obtained by the process already given for the preparation of hydrate of potash—namely, by the action of slaked lime on a boiling solution of carbonate of potash. Its sp. gr. is 1.058, and hence the solution is somewhat weaker than that of the London pharmacopœia, whose sp. gr. is 1.063, and which, according to the experiments of Mr. Phillips, contains 6.7 grains of potash in 100 grains of the solution. "One fluid-ounce requires, for neutralization, 48.25 measures of the volumetric solution of oxalic acid." Liquor potassæ, in combination with a tonic infusion, is of service in cases of dyspepsia which are accompanied with excessive acidity of the stomach, such, for example, as often occur in habitual spirit-drinkers. It is also frequently given with the view of rendering the urine alkaline, or of diminishing its acidity in cases in which that secretion is too acid. In chronic skin-diseases, especially those of a scaly nature, it often gives relief, if given in full doses, and for a sufficient time; and in chronic bronchitis it is given with advantage for the purpose of diminishing the viscidity of the bronchial mucus. The usual dose is ten drops, gradually increased to as much as a fluid dram. Infusion of orange-peel and table-beer are fluids which conceal its unpleasant taste. Veal-broth has also been recommended as a medicine in which to present it. Its too prolonged use renders the urine alkaline and sedimentary (from the deposit of phosphate of lime), and tends to impoverish the blood. *Sulphurated potash*, or *potassa sulphurata*—which is the new name for the sulphuret of potassium, or liver of sulphur (*hepar sulphuris*)—is obtained by fusing together carbonate of potash and sublimed sulphur. It occurs in solid greenish masses, which are liver-brown when recently broken. It is alkaline and acrid to the taste, readily forming with water a yellow solution, which has the odor of sulphureted hydrogen, and evolving that gas freely, on the addition of an excess of hydrochloric acid. It is sometimes given internally in doses of three grains (in the form of a pill made with soap), in obstinate skin-diseases; but is chiefly used as a lotion, bath, or ointment for these diseases. It must be recollected that this compound is an energetic narcotico-acrid poison, its action being very like that of sulphureted hydrogen. *Acetate of potash* ($KO,C_4H_3O_3$) is obtained by the action of acetic acid on carbonate of potash, and occurs in white foliaceous satiny masses. In its passage through the system it is converted into carbonate, and thus renders the urine alkaline. In small doses, as from a scruple to a dram, it acts as a diuretic, and is of service in some forms of dropsy. Combined with other potass-salts, it is much given in acute rheumatism. *Carbonate of potash* (KO,CO_2+2Aq) is employed in medicine in the same cases as those in which solution of potash is used. In large doses it acts, likes caustic potash, as an irritant poison. It is frequently employed in the preparation of effervescing draughts, 20 grains of this salt being neutralized by 17 grains of citric acid, or 18 grains of tartaric acid, or by half a fluid-ounce of lemon-juice. *Bicarbonate of potash* ($KO,HO,2CO_2$) may be used in the same cases as the carbonate or solution of potash. It is chiefly used for the manufacture of effervescing draughts, 20 grains of the crystallized salt being neutralized by 14 of citric acid, 15 of tartaric acid, and 3½ drams of lemon-juice. *Chlorate of potash* (KO,ClO_5) is prescribed with advantage in diseases of a low type, such as scarlatina maligna, cancrum oris, diphtheria, scurvy, etc. As it is eliminated unchanged by the kidneys, its *modus operandi* is unknown. It may be prescribed in doses of from 10 to 20 grains three times a day in solution. *Citrate of potash* ($3KO,C_{12}H_5O_{11}$) is obtained by neutralizing a solution of citric acid with carbonate of potash, filtering and evaporating to dryness, when the salt is deposited as a white powder of a saline, feebly-acid taste, deliquescent, and very soluble in water. It is procured *extempore* in a state of solution in the effervescing draughts for which we have given prescriptions in our remarks on the carbonates of potash. It acts mildly on the skin, bowels, and kidneys, whose secretions it promotes, and is an excellent cooling diaphoretic in fevers with a hot and dry skin, being less liable to act on the bowels than the tartrate or acetate of potash. In irritability of the stomach, it is an excellent remedy, when given as an effervescing draught. It may be taken in doses of a scruple or half a dram in solution every few hours. The therapeutic uses of *nitrate of potash* are noticed in the article NITER. *Sulphate of potash* (KO,SO_3) is useful as a mild laxative, a scruple of this salt, especially if combined with ten grains of rhubarb, usually acting mildly and efficiently. It has considerable power in repressing the secretion of milk, and has been much used for this purpose.

The uses of the *tartrates of potash* are noticed in the article TARTARIC ACID. *Bromide* *of potassium* (KBr) occurs in white, transparent, cubical crystals, and is occasionally employed in enlargement of the spleen and in certain forms of epilepsy. The uses of *iodide of potassium* are described in the article IODINE.

POTA'TO, *Solanum tuberosum* (see SOLANUM), one of the most important of cultivated plants, and in universal cultivation in the temperate parts of the globe. It is a perennial, having herbaceous stems, 1–3 feet high, without thorns or prickles; pinnate leaves with two or more pair of leaflets and an odd one, the leaflets entire at the margin; flowers about an inch or an inch and a half in breadth, the wheel-shaped corolla being white or purple, and more or less veined; followed by globular, purplish fruit, of the size of ordinary gooseberries; the roots producing tubers. The herbage has a slightly narcotic smell, although cattle do not refuse to eat a little of it, and the tender tops are used in some countries like spinach. The tubers are, however, the only valuable part of the plant.

The potato is a native of mountainous districts of tropical and subtropical America, probably from Chili to Mexico; but there is difficulty in deciding where it is really indigenous, and where it has spread after being introduced by man. Humboldt doubted if it had ever been found truly wild; but subsequent travelers, of high scientific reputation, express themselves thoroughly satisfied on this point. Except that the tubers are smaller, the wild plant differs little from the cultivated. Maize and the potato are the two greatest gifts which America has given to the rest of the world. The potato has been cultivated in America, and its tubers used for food, from times long anterior to the discovery of America by Europeans. It seems to have been first brought to Europe by the Spaniards, from the neighborhood of Quito, in the beginning of the 16th c., and spread from Spain into the Netherlands, Burgundy, and Italy, but only to be cultivated in a few gardens as a curiosity, and not for general use as an article of food. It long received throughout almost all European countries the same name with the batatas (q.v.), or sweet potato, which is the plant or tuber meant by English writers down to the middle of the 17th c., in their use of the name potato. It appears to have been brought to Ireland from Virginia by Hawkins, a slave-trader, in 1565; and to England by sir Francis Drake, in 1585, without attracting much notice, till it was a third time imported from America by sir Walter Raleigh. It was still a long time before it began to be extensively cultivated. Gerard, in his *Herball*, published in 1597, gives a figure of it under the name of *batata Virginiana*; but so little were its merits appreciated that it is not even mentioned in the *Complete Gardener* of London and Wise, published more than a century later, in 1719; while another writer of the same time says it is inferior to skirret and radish! It began, however, to be imagined that it might be used with advantage for feeding "swine or other cattle," and by and by that it might be useful for poor people, and for the prevention of famine on failures of the grain crops. The royal society took up this idea, and in 1663 adopted measures for extending the cultivation of the potato, in order to the prevention of famines. To this the example of Ireland in some measure led, the potato having already come into cultivation there, to an extent far greater than in any other European country, and with evident advantage to the people. From Ireland, the cultivation of the potato was introduced into Lancashire about the end of the 17th c., soon became general there, and thence spread over England; so that, before the middle of the 18th c., it had become important as a field crop, which it became in the s. of Scotland some 29 or 30 years later; about the same time, in Saxony and some other parts of Germany; but not until the latter part of the century in some other parts of Germany and in France. In France, the extension of potato culture was very much due to the exertions of Parmentier. In some parts of Germany, the governments took an interest in it, and promoted it by compulsory regulations.

The potato is of great importance as affording food both for human beings and for cattle; and next to the principal cereals, is the most valuable of all plants for human food. It is also used for various purposes in the arts. No food-plant is more widely diffused; it is cultivated in subtropical countries; and struggles for existence in gardens, even within the arctic circle, yielding small and watery tubers; although the effects of late spring frosts, or early autumnal frosts, upon its foliage often prove that it is a plant properly belonging to a climate milder than that of most parts of Britain. No more important event of its kind has ever taken place than the general introduction of potato culture into the husbandry of Britain and other European countries. It has exercised a most beneficial influence on the general welfare of the people, increasing national wealth, and preventing, as a few far-seeing thinkers had anticipated, the once-frequent returns of famine. That in 1846 and 1847 terrible famine resulted in Ireland and elsewhere from the failure of the potato crop itself, was owing only to the excess to which its cultivation had been carried. The results confirmed two great laws, that plants long very extensively or almost exclusively cultivated in any district, however successfully they may be cultivated for a time, are sure to fail at last, and that the exclusive, or almost exclusive, dependence of a people on one source or means of support is unfavorable to their welfare in respect to all their interests.

Humboldt calculates that the same extent of ground which would produce thirty pounds of wheat, would produce 1000 pounds of potatoes. But potatoes are not nearly so nutritious as wheat, and the constant employment of them as the chief article of food is not favorable to the development of the physical powers, and is consequently in its protracted influence unfavorable to mental energy. All this is too well illustrated in Ireland and the Highlands of Scotland, in a race capable of the highest development of both. It is calculated that 100 parts of good wheat-flour, or 107 parts of the grain, contain as much actual nutriment as 613 parts of potatoes. The inferiority of the potato in nutritious power is very much owing to the comparatively small quantity of nitrogenous substances which it contains, in consequence of which it is most advantageously used along with some very nitrogenous article of food, in Britain generally with animal food, in some parts of Europe with curds or with cheese. The potato tuber, in a fresh state, contains about 71 to 80 per cent of water; 15 to 20 of starch, 3 to 7 of fiber or woody matter, 3 to 4 of gum, dextrine, and sugar, and 2 of albumen, gluten, and casein. There are considerable differences, however, in different varieties, in different stages of maturity, and in different soils and seasons.

Potatoes are used, both raw and boiled, for the feeding of cattle. For human food, they are variously prepared by roasting or boiling, but now chiefly by boiling, a process by which they are freed from all that is narcotic and noxious in their juice. The water in which potatoes have been boiled is not wholesome, and those modes of preparing them for the table which do not admit of its complete rejection ought to be avoided.

The herbage or haulm of the potato has been used for making paper, but the results were not encouraging. The berries are sweetish, but not pleasant; nauseous when fermented, but yield by distillation a tolerable spirit.

The varieties of the potato in cultivation are extremely numerous. Any enumeration or classification of them is impossible. New ones are continually appearing, and old ones passing away. Those most advantageously cultivated in particular soils and climates are often found to degenerate when removed to a small distance. Many of the new varieties of potato are raised in Lancashire, but particularly of the garden kinds, which generally differ from those preferred for field culture in their greater earliness, and not unfrequently in their inferior productiveness, and in their being less *mealy* and less nutritious. Potatoes differ considerably in the character of their herbage—which is sometimes erect, sometimes straggling—and in the size and color of their flowers; but are more generally distinguished by the size, form, and color of their tubers, which are round, long, or kidney-shaped, white, red, dark purple, variegated, etc.

New varieties of potatoes are produced from seed; but potatoes are ordinarily propagated by planting the tubers, or cuttings of the tubers, each containing an *eye* or bud. Late crops of early potatoes are sometimes procured by cuttings of the stalks or by layers; methods which might probably be pursued with more advantage where the summer is longer than in Britain. Much has been written by gardeners and agriculturists on the comparative advantages of planting whole tubers or cuttings; but the latter method generally prevails.

Potatoes are planted in drills, made either by the spade or plow; or in *lazy-beds*, which are always made by the spade, and are beds in which the sets of potatoes are covered over with earth dug out of the alleys. The alleys serve, although imperfectly, for drains in undrained land. The cultivation of potatoes as a field-crop seems to have been first attempted in lazy-beds. They are still common in many parts of Ireland, but are now rare in most parts of England and Scotland. They are very suitable for strong, heavy, and somewhat moist land, and are profitably used in reducing some kinds of soil to cultivation; but are generally unsuitable for field-culture, owing to the expense of labor required. In strong heavy land, potatoes are cultivated in raised drills; in lighter and drier soils, the raising of the drills is unnecessary. Manure is generally given, consisting generally of dung and well-rotted straw from the farm-yard. Guano and other strong artificial manures are apt to produce an excessive growth of stalks and leaves, which is to be guarded against by diminishing or even withholding manure in certain soils, potatoes of too luxuriant growth being always particularly liable to diseases. The cultivation of potatoes, after they are planted, whether in the field or garden, consists chiefly in keeping the ground clear of weeds, and in earthing up the plants, to promote the formation of tubers. Potatoes are taken up either by the fork or by turning over the drills with the plow. Garden potatoes are generally used long before they are really ripe, forming a favorite dish in a very unripe state, when they are far from being a safe article of food, and contribute not a little to the prevalence of cholera and kindred diseases in summer. Field potatoes, unless when intended for the supply of the markets of towns, like garden potatoes, are allowed to ripen thoroughly, and are then capable of being stored for winter and spring use. Early potatoes are forced in hot-beds, and in the spare ground of hot-houses, that they may be obtained very early; also, after being thus brought forward in some degree, they are planted out in gardens, for a succession of young tubers. The planting of potatoes in the open air cannot be successfully practiced in most parts of Britain before February or March, and in many seasons the later planted are found as early as the earlier planted, and more productive. The storing of potatoes is variously accomplished in dry lofts or sheds, in airy cellars or barns, and in *pits*, which are sometimes holes excavated to a small depth in the earth, and the potatoes piled up above the surface of the ground, in a conical, or in a roof-like form, sometimes mere heaps of one or other of these forms upon the surface of the ground, and covered with straw and earth to keep out light and frost. The access of light makes potatoes green, bitter, and unwholesome, as is often seen in those which, whilst growing, have been partially above ground. Potato pits are often ventilated by means of pipes, as without ventilation the potatoes are apt to heat and sprout. Potatoes taken from the ground before they are quite ripe are extremely apt to heat and sprout.

The potato crop is now an important one in almost all the rotations practiced in Britain, although its cultivation is in most districts not quite so extensive as before its failure from the *potato disease* in 1845 and subsequent years, and farmers are more careful not to depend too much upon it. It very commonly succeeds a grain crop, but sometimes is advantageously planted on land newly broken up from grass.

The potato is subject to a number of diseases, of which the most important is the *potato disease* (q.v.) or potato murrain. Before it began to prevail, the chief diseases affecting the potato were those called *curl*, *scab*, *dry-rot*, and *wet-rot*. Of all these diseases, it would seem that one principal cause, however combined with other causes, is the exhaustion of the vegetative powers of the plant, from frequent propagation by tubers or cuttings of tubers. It is to be borne in mind that propagation by tubers is not properly reproduction, but one plant is divided into a multitude; and the whole analogy of nature seems to show, that although it may live longer in this way and more healthfully than if left to the spot where its seed first germinated, its existence will come to an end, and the species must be preserved by reproduction from seed. It was long since observed as to CURL, the dread of farmers and gardeners before the *potato disease* was known, that it most readily attacks potatoes which sprang from weak sets. Curl is a disease affecting the foliage and general health of the potato plant, and does not seem to be necessarily connected with the presence of any vegetable parasite or insect enemy.—SCAB is a disease of the tubers, which become covered with brown, oblong, and finally confluent and cup-shaped spots, whilst under the surface is a powdering of minute olive-yellow grains, a fungus called *tubercinia scabies*, of the division *hyphomycetes*.—DRY-ROT is also ascribed to the growth of a fungus of the same order, *fusisporium solani*, and attacks the tubers either when stored for winter or after being planted. It was very carefully investigated by Martius, and described in a memoir published in 1842. It was first observed in Germany in 1830, and caused great loss in that country throughout many years. The tissues of the potato tuber become hardened and completely filled with the mycelium of the fungus, which at last bursts forth in little cushion-shaped tufts loaded with fructification.—WET-ROT differs from dry-rot in the tubers becoming soft and rotten instead of hard and dry, and is always characterized by the presence of a fungus referred by Fries to his genus *periola*, but which Berkeley regards as another form or stage of the same fungus which causes or is inseparably connected with dry-rot. Both dry-rot and wet-rot have often been observed along with the *potato disease*, which, however, is always characterized by the presence of another peculiar fungus.

But, besides its value as a culinary vegetable, the potato is important in other respects. Its starch is very easily separated, and is in large proportions; hence it is cheaper than any other kind. It is manufactured on a very large scale both in this country and on the continent. It is chiefly used in textile manufactories under the name of *farina*, which is converted into dextrine or British gum. See STARCH. In Holland and in Russia, where there is much difficulty in keeping potatoes through the winter, and there is consequently a necessity for using the crop quickly, large quantities of starch are made, and this is converted into sugar or syrup. See SUGAR. The refuse of the starch-manufactories is all economized; it is pressed out from the water, and either used for pig-feeding or for manure. In the north of Europe, much spirit for drinking is made from potatoes; it is called potato brandy

POTATO-BEETLE. See COLORADO-BEETLE.

POTATO BUG, or COLORADO POTATO BEETLE, a name now generally applied to a coleopterous insect, the *doryphora decem-lineata* of Say. It is indigenous to the cañons and table-lands of the Rocky mountains, where it feeds upon various wild species of solanum (*S. rostratum* and *S. cornutum*). As the cultivated potato began to be introduced westward into or towards those regions, the beetle commenced feeding upon it, and the abundance of food thus furnished has caused a great multiplication of the pest, and its rapid extension eastward. It commenced its *ravages* in 1859, and for the past five years, that is, since 1876, it has become naturalized in the potato-growing sections throughout the United States and Canada. Its natural history was first made known in 1863 by prof. C. V. Riley, the Missouri state entomologist. In 1865 it crossed the Mississippi river into Illinois and Wisconsin. In 1867 it invaded Indiana and Michigan, and in 1868 it visited Ohio. In 1875 it reached the seaboard, marching faster in the more northern portions because thriving best in the cooler climates, and where the soil is less affected by the droughts of summer. It does not pass *through* the country, but *extends into it*, leaving permanent colonies behind. After the first few years, however, these do not flourish as well as the immigrants and their first descendants, because of the increase of parasites and other enemies which live upon them. The beetle in its perfect state is about one-third of an inch long, of a hemispherical shape, and of a yellow color, with ten black stripes on its elytra, or wing covers, five on each elytron. It passes the winter in the ground beneath the frost at various depths (hibernating), sometimes going 2 or

3 ft. beneath the surface, depending upon the nature of the soil, the average depth being, in the middle states, perhaps from 9 to 12 inches. Soon after the frost is out of the ground and vegetation starts in the spring, and before the potatoes are up, the bug issues from its sleeping place. Whatever else it may feed upon, it does not wait for the potatoes to come out of the ground, but will find the young shoots beneath the surface and commence its depredations. As soon as the leaves are exposed to the air the females commence to lay their eggs, which are deposited in clusters of from 10 to 40 or more, on the under side of the leaf. They are of an orange color, and oval in shape. They hatch within a week, producing dark, dull-red larvæ, which gradually assume a lighter color and acquire two rows of black spots on each side. The legs, the head, and the posterior half of the first joint are also black. The larvæ feed voraciously upon the potato leaves and become full grown in about 20 days, when they crawl into the earth to pass through the pupa and into the beetle state, all of which is accomplished in about five weeks from the time the eggs are laid, or a little over four from the time of hatching. Mr. Riley says that there are three broods produced in one season in the latitude of St. Louis. These broods are, however, not all developed at regular intervals, but owing to the fact that the ovaries continue to develop eggs for a considerable time, each female lays several batches at intervals. Mr. Riley estimates the average number laid by one female to be from 500 to 700. Whole potato crops, sometimes covering scores of acres in a body, have been swept away in a few days by the ravages of the myriads of disgusting larvæ of these beetles. In portions of the country where potatoes are grown near the sea-coast, as on the southern shore of Long Island, the insects have either flown or been driven into the waves by the wind in such numbers as to form considerable ridges on the beach when washed ashore; not dead, however, but able to crawl and fly away. They will feed upon other plants of the solanaceæ, but without the cultivated potato they could not multiply as they do. In emergencies they sometimes feed upon other plants, such as pig-weed, maple-leaved goose foot, and some other weeds. Fortunately they have active enemies, viz., insectivorous birds (q.v.), parasitic and predatory insects, and man. The only true parasite of the potato bug is a *dipterous* insect, a tachinæ fly (*lydella doryphoræ*), about the size of the common house fly. This insect lays its eggs on the body of the larvæ of the beetle, and when the eggs hatch their larvæ enter that of the beetle, and descend with it into the ground when it goes there to be transformed, this process being arrested, however, by its translation to the bodies of the tachinæ larvæ. Many of its enemies are predatory insects of its own order, *coleoptera*, as the fiery ground-beetle, and others of the *carabidæ*, who seize and devour it; several species of lady-bird (q.v.) feed upon its eggs. Other insects of the dipterous and hemipterous orders also pounce upon the beetle and suck its juices, or feed upon it. But as the bug is a greater enemy to man than to anything else, so man is the bug's greatest enemy, and with the use of arsenite of copper, or Scheele's green, commonly called Paris green, he destroys myriads of the pests, and, when persistent and industrious, succeeds in saving his potatoes. There are two modes of using this effective poison; one is to mingle a large tablespoonful of it with about three gallons of water, and sprinkle the attacked plants with a fine sprinkler, once or even twice a day. This is quite rapidly done by active men, each man going between two rows and sprinkling both. The other and most favorite method, the result of recent trials, is to mingle the Paris green with *plaster of Paris* in the proportion of one part to 25 or even 50 parts of the latter, and dust the leaves of the plant. This does not wash off as soon as the simple watery mixture, as the plaster is not very soluble, and in uniting with a certain portion of atmospheric moisture, forms a thin film or crust, which does no injury, but, remaining as it usually does, if rains are not heavy, a few days, is a protection against the bugs. The application is made with a spoon or some instrument answering the same purpose, as it is dangerous to use the hands. No bad effects upon the persons of the operators have been known to follow the use of this poison by either of these methods, except with the grossest carelessness, and no injury is done to the plant with anything short of an excessive and unnecessary quantity; neither is the soil made injurious to other vegetation, as far as the observations of good authorities go.—There is what is called a *bogus* Colorado potato beetle, the *doryphora juncta*, which much resembles the genuine pest, and has been mistaken for it, but the larvæ have only one row of lateral black spots, and the stripes on the elytra are differently arranged. In the bogus bug the second and third stripes, counting from the lower edge, are joined at the ends, whilst in the potato bug the third and fourth stripes are the ones whose ends are united. The bogus bug, or *doryphora juncta*, does not feed upon the potato, or has not thus far, but upon the wild horse-nettle (*solanum carolinénse*), and upon close examination the two species are found to have several marked differences. See COLORADO BEETLE, *ante*.

POTATO DISEASE, or POTATO MURRAIN. No subject connected with agriculture or with botany has given rise within so short a time to so extensive a literature as this. It has been treated in books and pamphlets, and in magazines and periodicals of every kind. The terrible famines caused by the failure of the potato crop in Ireland and other countries, particularly in 1846 and 1847, concentrated upon it the attention of the whole civilized world; and yet it remains very obscure.

The potato disease seems to have been at first confounded with dry rot and wet rot (see POTATO), which appeared a number of years before it to a formidable extent, although not to be compared with it in their ravages. This fact—and all the more if the potato disease is to be ascribed to the presence of a different and peculiar fungus—may perhaps be held as giving support to the opinion that its chief cause was really the weakening of the plant through too constant cultivation on the same land, and continued propagation by tubers alone.

The potato disease was first observed in Germany, and first assumed a very serious character near Liége in 1842. In 1844 it broke out in Canada, and all at once proved very destructive. In 1845 it was first noticed in England, and first in the isle of Wight. But during that year, its ravages were considerable in the British islands; much more so in the year following, when the Irish famine was the consequence, and in the same year it prevailed very extensively over almost all parts of Europe. The summer was unusually cloudy and moist, a circumstance probably not without its effect. In 1847 the disease was still prevalent, but to a smaller extent; and since that time its prevalence has gradually diminished, although it occasionally breaks out in particular localities. Meanwhile, it is to be observed, that almost all the varieties of potato cultivated to any considerable extent before 1846 have disappeared, and been replaced by others. Lest too much, however, should be inferred from this in favor of a particular theory, it must also be stated, that potatoes newly raised from seed were sometimes severely attacked by the disease during the period of its greatest prevalence.

No fully satisfactory theory as to its cause or origin has been proposed. That it has long existed in the western parts of America, may probably be true, as has been alleged, although the distinction between it and other diseases of the potato might not perhaps be noted with sufficient care; but even this would not account for its sudden appearance and terrible devastations in other parts of the world. Many observers ascribed it to insects and *acari*, some even to infusoria in the tissues, but the presence of none of these was found to be constant, and they appeared therefore rather to be the consequences than the cause of the disease. It is otherwise with the fungus, *botrytis infestans* (see BOTRYTIS), which is always present, although, probably like other parasites, it generally attacks an already weakened plant. The disease generally first appears in the leaves, and thence extends to the tubers, although it has been sometimes observed to appear in the tubers of some of the early kinds of which the leaves have perished before the season when it breaks out. It sometimes also lies dormant in the tubers for months, so that after being stored apparently sound in autumn, they become diseased in the following spring. When the disease appears in the growing plant, brown spots are first to be noticed on the margins of the leaves, corrugating the leaves as they spread. Very rapid extension of the disease, and decay of the leaves and stalks often ensue. It is on the under surface of the leaf that the *botrytis* is found; it abounds also in the diseased tubers, which, when cut, produce an abundant crop of it from the fresh surface, and it sometimes vegetates even from the natural surface. The same fungus has been found in the berries of the tomato (q.v.) when diseased, and on the leaves of other plants of the natural order *solaneæ*, but never on any plant not of that order. See COLORADO BEETLE.

The starch granules which exist within the cells of potatoes seem not to be affected by the potato disease, but remain unaltered in quality, so that as good potato starch is made from unsound as from sound tubers. On occasion of the great ravages of the disease in 1846, however, advantage was but partially taken of this fact, partly from ignorance of it; partly from an apprehension, apparently quite unfounded, that the starch might prove unwholesome; and partly from the want of machinery to grate down the diseased potatoes before rottenness had involved the whole.

POTATO-FLY, *Anthonyia tuberosa*, a dipterous insect of the same genus with the beet-fly, cabbage-fly, turnip-fly, etc. In its perfect state, it is very like the house-fly. The male is about five lines long, grayish-black, bristly, with five indistinct broad stripes on the back, and four ocherous spots on the second and third segments; the female ashy-slate color, with two indistinct ocherous spots on the second abdominal segment. The maggots are very abundant in bad potatoes in autumn, and are very different from the maggots of the house-fly, being horny, spiny, bristly, and tawny; the long tail ending in six long bristles. The pupa is very like the larva.

POTATO, SWEET. See BATATAS, *ante*.

POTCHINKY, a district town of European Russia, in the government of Nijni-Novgorod, 110 m. s.s.e. of the city of that name, and 800 m. s.e. from St. Petersburg. It is one of the centers of the corn-trade of the country, and exports potash. Pop. '67, 7,777.

POTEMKIN,* GREGORY ALEXANDROVITCH, the most celebrated of the czarina Catharine II.'s favorites, was born near Smolensk in Sept., 1736. He was descended of a noble Polish family, and at an early age entered the Russian army, and rose to be ensign in the imperial horse-guards. Happening to attract the notice of the czarina by his noble appearance and handsome, athletic figure, he was forthwith (1762) attached to her household, and appointed colonel and gentleman of the bed-chamber. After a time (1774) he superseded Gregory Orlov (q.v.) in the good graces of the czarina, and became her favorite and avowed lover. He played the part of lover for only two years, when he was superseded by a younger and more amiable successor; but the ascendency which he had acquired over the czarina was in nowise affected by this change. He knew well how to flatter her vanity, rouse her fears, and make her believe that he alone could protect her from the numerous conspiracies (some of which were real, and many mythical) which were being constantly formed against her. Catharine submitted to all his caprices, consulting him in everything, and was in almost all cases guided by his advice. Potemkin was consequently, from 1770 till the year of his death, the true representative of the Russian policy in Europe; and Frederick the great of Prussia, and even the haughty Hapsburgs, Maria Theresa and Joseph II., cringed at his feet, and at the demand of the czarina, loaded him with titles and honors; though, much to his chagrin, he failed to obtain the English order of the Garter, and the French one of the Holy Spirit. Potemkin interfered little with the internal government of Russia, beyond offering many valuable suggestions for the development of manufactures and industry, which were carried out; his important achievements being connected with the foreign policy of Russia, especially as far as it related to Turkey. It was at his instigation that the Turks were forced into war, and robbed of their territories n. and e. of the Black sea, in order that Russia might possess a southern sea-board; and after this had been done, Potemkin immediately ordered the creation of a Black sea fleet, and the building of Kherson, Kertch, Nikolaiev, and Sebastopol. For his services, he was created governor of the Taurida (q.v.), and loaded with numerous honors and presents. In 1787 Catharine paid a visit to him at his government, and the "hoax" which he played off on his sovereign is well described by De Segur. He caused an immense number of wooden painted houses to be constructed, and grouped into towns and villages along the route the czarina was to take, and hired people to act the part of villagers, merchants, tradesmen, and agriculturists, engaged in their various pursuits. The czarina's vanity was hugely gratified at the seeming improvements of the country under her rule, and Potemkin was rewarded for his dexterity by further honors and emoluments. Almost immediately after this a war broke out with the Turks, and Potemkin was placed at the head of the army, with Suwarof and Repnin for his lieutenants. His career was one of uninterrupted victory. Bessarabia and the two principalities were conquered, and he was about to advance on Constantinople, when the empress commanded a cessation of hostilities; but before Potemkin had time to bring her round to his own views, he was seized with sudden illness on the road between Jassy and Nikolaiev, and died there, Oct. 15, 1791.

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* The name is pronounced *Patiumkine* by Russians.

POTENT, CROSS, in heraldry, a cross crutch-shaped at each extremity. It is also called a Jerusalem cross, from its occurrence in the insignia of the Christian kingdom of Jerusalem, which are, argent a cross potent between four crosslets or. This coat is remarkable as being a departure from the usual heraldic rule which prohibits the placing of metal upon metal.

POTENT COUNTER POTENT, one of the heraldic furs, in which the field is filled with crutch-shaped figures alternately of metal and color, those of opposite tinctures being placed base against base, and point against point. The metal and color are understood to be argent and azure, unless they be specially blazoned otherwise. Potent counter-potent is sometimes blazoned vairy-cuppy.

POTENTÉE, a heraldic line of division which takes the form of the outline of a succession of crutch-shaped figures.

POTENTIL'LA, a genus of plants of the natural order *rosaceæ*, suborder *potentilleæ*, differing from *fragaria* (strawberry) in the fruit having a dry instead of a succulent receptacle. The species are very numerous, natives chiefly of northern temperate regions, and some of them of the coldest north; most of them perennial herbaceous plants, with yellow, white, red, or purple flowers, and pinnate, digitate, or ternate leaves. They are often called CINQUEFOIL (Fr. five-leaved); and some of the species are favorite garden flowers. A few are natives of Britain; one of the rarest of which is a shrubby species (*P. fruticosa*), forming a large bush, with pinnate leaves, and a profusion of yellow flowers, often planted in shrubberies. *P. reptans*, a common British species, with creeping stems, digitate leaves, and yellow flowers, once had a high reputation as a remedy for diarrhea, from the astringent property of its root, of which most of the species partake with it. But *P. anserina*, a very common British species, properly known as SILVERWEED, having creeping stems, yellow flowers, and pinnate leaves, which are beautifully silky and silvery beneath, has an edible root, with a taste somewhat like that of the parsnip. Swine grub it up with avidity, and it was once much esteemed as an article of food in some parts of Scotland, particularly in the Hebrides, where it abounds and has been a resource in times of famine.—The name potentilla is said to be derived from the Latin *potens*, powerful, and to allude to medicinal virtues now known to merit little regard. Tormentil (q.v.) is sometimes referred to this genus.

POTEN'ZA (anc. *Potentia*), in s. Italy, the chief t. of the province of Potenza, is situated on a hill of the Apennines, near the river Vasente or Basento, 54 m. e. of Salerno. Pop. 18,500. It is surrounded by a wall, has a fine cathedral of the Doric order, and is the seat of an archbishop. Potenza was shaken by earthquakes in 1273, 1694, and 1812. The province of Potenza, which, as a *compartimento* of the kingdom, is called Basilicata, used to suffer severely from brigandage.

POT-HERBS are not, as might be supposed from the name, the vegetables chiefly used for culinary purposes as a supplying articles of food, but rather those which are of secondary importance, and valuable chiefly for flavoring, as parsley, fennel, etc.

POTHIER, ROBERT JOSEPH, 1699–1772; b. Orleans, France; studied law, practiced successfully, and became a judge in his native town. In 1849 he was appointed a professor of French law. He is best known by his legal writings. His *Maritime Contracts*, *Law of Obligations or Contracts*, and *Contracts of Sale* have been published in this country, the first translated by Caleb Cushing. His most important work was *Pandectæ Justinianeæ in Novum Ordinem Digestæ.*

POT-METAL is an alloy of lead and copper, obtained by throwing lumps of copper into red-hot melted lead. It is of a gray color, brittle and granular.

POTOCKI, IGNACY, 1751–1809; b. Poland; cousin of Stanislaw. He helped to form the constitution of May 3, 1791; fled to Prussia upon the invasion of Poland by the Russians, but returned after the success of Kosciuszko, and was a member of the new government. He was made prisoner by Suvaroff, and confined in Schlusselburg. Released in 1796, he lived in Galicia till the approach of Napoleon's army in 1806, when he was again imprisoned for a short time.

POTOCKI, STANISLAW FELIX, 1745–1803; b. Poland; in 1792 in conjunction with Branicki and Rzewuski, issued the manifesto of the confederation of Targovitza. The next year he attempted by the aid of Catharine II. to carry out the objects of the confederation. The insurrection of 1794 forced him to leave Poland, and he came to the United States. In his absence he was sentenced to death for treason, but the success of Suvaroff enabled him to return to Poland, and he was appointed field-marshal by Catharine.

POTOCKI, STANISLAW KOSTKA, 1757–1821, brother of Stanislaw Felix, was prominent in drawing up the constitution of Poland of 1791, and after the second partition, in 1792, was for a short time under arrest. After his release he became eminent in science and literature. In 1807 he was made president of the Warsaw board of education; and after the kingdom of Poland was reorganized, 1815, became minister of public instruction. He wrote a treatise on the *Art of the Ancients* and *On Eloquence and Style* (1815).

POTOMAC, a river of the United States, formed by two branches, which rise in the Alleghany mountains, and unite 20 m. s.e. of Cumberland, Maryland, from which point the river flows in a generally south-easterly course, 400 m., and falls into Chesapeake bay, where it is 6 to 8 m. broad, 75 m. from the ocean. Line-of-battle ships ascend to Washington, 120 m. from its mouth, and the tide reaches Georgetown. Between Westport and Washington, 220 m., it falls 1160 feet. The scenery in this portion of its course is wild and beautiful, especially where it breaks through the Blue ridge at Harper's ferry. Its principal affluents are the Shenandoah, Savage, Monacacy, and Acquia creek. The Potomac forms the greater part of the boundary between Virginia and Maryland. During the war which began in 1861, both federal and confederate armies crossed several times the fords of the upper Potomac, and severe actions were fought upon its banks

POTOROO, or KANGAROO RAT, *Hypsiprimnus*, a genus of marsupial quadrupeds, of the family *macropidæ* (see KANGAROO), differing from kangaroos chiefly in having distinct canine teeth in the upper jaw. The first pair of incisors in the upper jaw are also longer and larger than the others. The molars decrease in size backward; and when not worn, present four blunt tubercles. The fore-limbs are proportionally longer, the hinder-limbs less powerful than in the kangaroos. The general form and habits are similar; there is the same sitting on the hind feet with help of the tail for support, and a somewhat similar hopping, but not nearly an equal power of vigorous leaping. The stomach is large, and divided into two sacs, with several inflations; the food entirely vegetable. There are several species, all of small size, none of them larger than a rabbit, and all natives of Australia, timid and harmless creatures They are generally clothed with a dense, and sometimes a beautiful fur; but the tail is nearly destitute of hairs and scaly.

POTOSI, a department of Bolivia, having Peru on the w. and s.w., the Pilcomayo river on the e., Chuquisaca on the n.e., and Oruro on the n.; 31,800 sq.m.: pop. 250,000. It is divided into the provinces of Chayanta, Chichas, Potosi, Lipes, and Poreo. Its surface is elevated, embracing the Cerro Gordo de Potosi, 16,000 ft. above the level of the sea, containing silver mines of great value. Between 1545–1789 the mines in this department produced $1,000,000,000 of silver, and at present the annual yield is $2,250,000; other mineral products are gold, copper, iron, lead, tin, manganese, quicksilver, precious stones, etc. It also includes the Poreo, a peak of the Bolivian Andes, containing the first silver mine opened by the Spaniards after the conquest of Peru. The face of the country is varied by lakes in the w. portion, springs are numerous in the mountains, sometimes interfering with mining operations, and it is drained by the branches of the Pilcomayo. The soil is unproductive and the climate is cold. Capital, Potosi.

POTOSI, one of the richest mining-towns of South America, the second t. of Bolivia, and capital of a department of the same name, stands in a dreary and barren district, 13,330 ft. above sea-level, in lat. 19° 35′ s., and long. 65° 25′ w., 70 m. s.w. of Chuquisaca. It covers a large area, and in 1611 its population was 170,000, but in 1865 it was 25,774, and great part of the town was in ruins. In its center is a large square, around which are ranged the principal public edifices, as the government-house, town-house, cathedral, etc. The mint is a large building, in which the average amount now coined amounts to about $2,000,000 annually. In the central square an obelisk in honor of Bolivar was erected in 1825. English and French manufactures are imported; and as the country in the vicinity produces little or nothing, all supplies have to be brought from a distance. The Cerro (sierra) de Potosi, or Silver mountain, is 15,200 ft. high. Its summit is honeycombed with upward of 5,000 mines, and operations are now carried on at a lower level, where the inrush of water, however, often compels the miners to abandon the richest mines. The quantity of silver extracted from the mines of this mountain has amounted in one year to the considerable sum of £330,544,311 sterling. —Bollaert's *Antiquities of South America.*

POT-POURRI, in French, the name of a mixture of sweet-scented materials, chiefly flowers, dried, and usually placed in a vase with a perforated lid, in order that their perfume may be diffused through rooms in which it is placed. The principal ingredients are rose-petals, lavender flowers and stalks, violets, jessamine flowers, woodruff leaves, cloves, orris-root, pimento, musk, sandal-wood, raspings, cedar-shavings, etc. But it also signifies a dish of different sorts of viands, and corresponds in this sense to the *hotch-potch* of Scotland, and the *olla podrida* (q.v.) of Spain.

POT-POURRI, in music, a selection of favorite pieces strung together without much arrangement, so as to form a sort of medley.

POTSDAM, a city in the Prussian province of Brandenburg, and, next to Berlin, the handsomest and best built town in Prussia, is situated on an island at the point of junction between the small stream of the Nuthe and the river Havel, 16 m. s.w. of Berlin. Pop. '71, 43,784 (with 5,475 soldiers); in 1875, 45,003. Potsdam is the usual summer residence of the royal family of Prussia, and seat of the imperial court. The city is divided into Old Town and New Town, and has four suburbs. The streets are broad and regularly built, and there are fine squares, some of which are planted with trees, forming pleasant public walks. Of the many large and handsome buildings, one of the most worthy of notice is the old royal palace, an oblong parallelogram, three stories high, with a magnificent colonnade facing the fine Havel bridge. Potsdam has several benevolent and educational institutions connected with the state, as, for instance, two asylums for the orphan children of military men, and one for those of persons belonging to the civil service; schools for cadets, subalterns, and privates; the luisendenkmal, an institution for providing for indigent girls of irreproachable character; a gymnasium, a high-school, and various other training and special schools. Among the churches, the most noteworthy are the garnisonskirche, with a tower 400 ft. high, a fine chime of bells, and a noble marble pulpit, below which rest the remains of Friedrich Wilhelm I. and Friedrich II., and St. Nicolai's, lately rebuilt after the model of the pantheon at Paris. The Brandenburger-Thor, which is the handsomest of the various gates, is a triumphal arch copied from Trajan's arch at Rome; and this, like the other gates, opens upon a fine *allée* of trees. Potsdam is surrounded with pleasant public walks and gardens, wooded heights, and vine-covered banks; while in the immediate neighborhood are numerous royal country palaces, as Sans-Souci, the favorite residence of Frederick the great, surrounded by a fine park, pleasure-grounds, and choicely-stocked gardens, near which stands the Ruinenberg, with artificially constructed ruins, designed to conceal the water-works which supply the fountains of the palace. Near the park is the new palace, begun in 1763, 680 ft. in length, containing nearly 100 rooms, many of which are filled with costly works of art. Near Sans-Souci is Charlottenhof, built by the late king, a pleasant villa, with lovely gardens, in which stands a Pompeian house. The Russian colony of Alexandrowska, with its Russian houses and Greek church, lies near the Pfingstberg, which is surmounted with an unfinished palace, from whence a fine view is obtained of the numerous royal parks and gardens, and the surrounding country. In the new garden stands the marble palace, with arcades adorned with frescoes of the *Nibelungen Lied*

Potsdam is the seat of the provincial government, and of several of the state manufactories. Of these, the most important is the manufactory of arms, at which the rifles for the army are made. There are also numerous private manufactories of machinery, chocolate, tobacco, cotton goods, silk, leather, wax-cloth, beer, etc.

Potsdam owes its creation as a town to the great elector Friedrich Wilhelm, who built a royal palace here between 1660 and 1673, and laid out several good streets. Prior to that period it was an insignificant fishing village, built on the site of an ancient Wendish settlement.

POTSDAM, a township and village in New York, on Racket river, St. Lawrence co., in the northern portion of the state, between lakes Ontario and Champlain. There are quarries of sandstone, mills and factories on the falls of the river, a railway connecting it with Watertown, a bank, and six churches. Pop. '70, 7,774.

POTSDAM SANDSTONE, the term applied by New York geologists to the lower member of the lowest Silurian series, so called from Potsdam, New York. It is a red or yellow sandstone, found in New York and in the far w., upon the crystalline eozoic rocks, and in Missouri and s.w. upon the Huronian.

POTSTONE, *Lapis ollaris* of the ancient Romans, a variety of talc (q.v.), or rather a mineral formed by a mixture of talc with chlorite, etc. It is generally of a grayish-green color, sometimes dark green. It occurs massive, or in granular concretions. It is soft and easily cut when newly dug up; greasy to the touch, and infusible even before the blow-pipe. It becomes hard after exposure to the air. It is made into pots and other household utensils, which communicate no bad taste to anything contained in them, and when greasy are cleaned by the fire. It was well-known to the ancients; and Pliny describes the manner of making vessels of it. It was anciently procured in abundance in the isle of Siphnos (now Siphanto), one of the Cyclades, and in Upper Egypt. Large quarries of it were wrought on the lake of Como, from about the beginning of the Christian era, to Aug. 25, 1618, when they fell in, causing the destruction of the neighboring town of Pleurs, in which it was wrought into culinary vessels, slabs for ovens, etc. It is quarried in the Valais, where it is called *giltstein;* in Norway, Sweden, Greenland, and near Hudson's bay, etc. "Should you again visit Italy, and pass by the great St. Bernard, if the cold of that frigid region should induce you to warm yourself in the refectory of the hospitable monks of the convent, you will there see a stove of potstone."—*Jackson on Minerals and their Uses.*

POTT, Aug. Friedr., a distinguished philologist, was born at Nettelrede in 1802, attended school at Hanover, studied theology and philology at Göttingen (1821), and finally (1833) became professor of the science of language in the university of Halle. Next to W. Humboldt, Bopp, and Grimm, the name of Pott stands prominent in the new science of comparative philology. The foundation of his reputation was laid by his *Etymologische Forschungen* (Etymological Researches, 2 vols. Lemgo, 1833–36), a work second in importance only to Bopp's *Comparative Grammar.* In a well-known article in Ersch and Gruber's Encyclopædia, *Indogermanischer Sprachstamm* (2d sect. vol. 18), he gave a masterly sketch of the Aryan languages (q.v.). In numerous articles in periodicals, and in separately published treatises (e.g., *De Borussico-Lithuanicæ tam in Slavicis quam in Letticis Linguis Principatu,* Halle, 1837–41; and *Die Zigeuner in Europa und Asien,* 2 vols. Halle, 1844–45), he carried his researches into special fields of this great province. *Die Quinare und Vigesimale Zählmethode* (The Quinary and Vigesimal Notation, Halle, 1847), and *Die Personennamen* (Proper Names, Leip. 1853), are admirable treatises, containing an overwhelming mass of information, and showing an astonishing knowledge, not only of the Aryan languages, but of other Asiatic, African, and American races. In 1856 he published a work on the *Difference of Races from a Philological Point of View,* and in 1868 one on the *Diversities of European Languages.*

POTT, Percival, 1713–88; b. London; assistant surgeon in St. Bartholomew's hospital, and in 1749 one of the principal surgeons. He has always been distinguished for his investigation of the subject of angular curvature of the spine, the consequence of disease of the bones of the spinal column, on which account the affection is known as Pott's disease (q.v.). His principal works are: *A Treatise on Ruptures; Hernia Congenita; Observations on Fistula Lachrymalis; Observations on the Nature and Consequence of Wounds and Contusions of the Head; General Remarks on Fractures and Dislocations; On the Cure of Hydrocele by Seton; Remarks on that kind of Palsy of the Limbs which attends Curvature of the Spine; Further Remarks on Curvature of the Spine.*

POTTAWATTAMIE, a co. in s.w. Iowa, bounded on the w. by the Missouri river, drained by the Boyer and West Nisbnabatona rivers, and Keg, Mosquito, Silver, and Walnut creeks; traversed by the Chicago and Northwestern railroad; about 990 sq.m.; pop. '80, 39,846—32,740 of American birth. The surface is rolling prairie or woodland. The soil is fertile. The principal productions are corn, wheat, hay, and oats. Co. seat, Council Bluffs.

POTTAWATTAMIE, a co. in n.e. Kansas, bounded on the s. by the Kansas river, and on the w. by the Big Blue; drained by Rock and Red Vermilion creeks; traversed by the Kansas Pacific railroad; about 850 sq.m.; pop. '80, 16,347—13,615 of American birth. The surface is rolling. The soil is fertile. The principal productions are corn, oats, wheat, and live stock. Co. seat, Louisville.

POTTAWATTAMIES, an Algonquin tribe of Indians. They originally occupied lands in the lower Michigan peninsula, were warlike in character and had less of tribe organization than most Indian races. They aided the French in their war with the Iroquois, who had driven them as far w. as Green bay. The Pottawattamies took part in Pontiac's war and in the capture of fort Joseph, were hostile to the colonists in the revolution, and in the war of 1812 again aided the English. In 1815 they made a treaty giving up their lands in Michigan, Illinois, and Indiana; and about 800 of the 4,000, belonging to different bands, were removed to a large reservation on the Missouri river. Missions had been established among them at an early date by French priests; and those originally living on the Huron, St. Joseph and Wabash rivers were somewhat advanced in civilization. In treaties of 1862 and 1867 the right to take title in severalty was granted, and 1400 took advantage of the offer, 700 continuing in the tribal relation. The latter were mostly the prairie or roving bands. They have since been greatly scattered among other tribes; the remnant occupies a reservation in Jackson co., Kansas, and are under the charge of the Quakers.

POTTER, a co. in n. Pennsylvania, bounded n. by New York; drained by the Genesee and Allegheny rivers and several creeks; 1050 sq.m.; pop. '80, 13,798—12,822 of American birth. The surface is rugged and hilly. Potatoes, hay, oats, and dairy products are the staples. Coal is found. Lumber is the chief export. Co. seat, Coudersport.

POTTER, ALONZO, D.D., LL.D., 1800–65; b. Dutchess co., N. Y.; entered Union college when 15 years old, attaining at once the highest rank in his class; was appointed tutor before 21 years of age, and, a year after, professor of mathematics; ordained a presbyter in the Protestant Episcopal church, 1824; and became rector of St. Paul's church, Boston, 1826. Resigning with impaired health, 1831, he was immediately elected professor of intellectual and moral philosophy in Union college, and in 1838 vice-president; elected and consecrated bishop of the diocese of Pennsylvania, 1845. Few Christian ministers were more honored, not by his own church alone, but by all denominations of Christians. He went to California for his health; but contracted a fever on the isthmus, and died on board the steamer in the harbor of San Francisco, three days after his arrival. Among his published writings are, *The Principles of Science applied to the Domestic and Mechanic Arts; Political Economy; Discourses, Charges, and Addresses; Religious Philosophy;* and five courses of *Lowell Institute Lectures*, published only in a newspaper report.

POTTER, CLARKSON NOTT, b. Schenectady, N. Y., 1825; son of bishop Alonzo Potter; received his education at Union college, where he graduated in 1842, and at the Rensselaer institute, Troy, N. Y., in 1843, where he studied civil engineering. He practiced surveying for a time in Wisconsin, and then studied law, and was admitted to practice at the Wisconsin bar. He removed to New York in 1847, and soon established himself in a lucrative business. Entering politics with much energy, he reached a prominent position, and in 1871 was elected a democratic representative in congress, and re-elected continuously, including an election to the 45th congress. He became conspicuous in 1878 as chairman of the committee appointed by the house of representatives to investigate the "alleged fraud in the late presidential election in the states of Louisiana and Florida." Mr. Potter was not a member of the 46th and 47th congresses.

POTTER, ELIPHALET NOTT, D.D., son of bishop Alonzo Potter, and grandson of president Nott; b. Schenectady, N. Y., 1836; graduated at Union college, 1861; studied theology; was ordained presbyter in the Protestant Episcopal church: and was rector of churches at Troy, N. Y., and Bethlehem, Penn.; was chosen professor of Christian evidences in Lehigh university, 1866; and president and chancellor of Union university (formerly Union college), 1872; has published *Parochial Sermons;* and is writing *Christian Evidences at the Close of the Nineteenth Century.*

POTTER, ELISHA REYNOLDS, 1764–1835; b. Rhode Island; a blacksmith's apprentice in his youth, but succeeded in acquiring some knowledge of the law, and followed that profession until about 1793. From this time for twenty-five years he was a representative in the state assembly, or in congress. He was five times speaker of the house, and was a candidate for governor of Rhode Island in 1818. Hon. Josiah Quincy says of him, "The position of Mr. Potter in his native state has now faded to a dim tradition. It was of the authoritative kind which belongs to men who bear from nature the best credentials." Drake remarks, "Few political men in Rhode Island ever acquired or maintained a more commanding influence." Mr. Quincy, further describing him, says he was "one of the largest men I have ever seen, excepting of course the professional giants." This was so far the fact that when he traveled he was obliged to pay for two seats in a stage-coach.

POTTER, HAZARD ARNOLD, 1810–69; b. N. Y.; studied medicine at Bowdoin college, and began practice in Rhode Island. Soon afterward he removed to Geneva, N. Y., where he acquired a high reputation as a surgeon. Among his successful operations were ligature of the carotid artery, gastrotomy for intussusception of the bowels, removal of fibrous tumors of the uterus, and the removal of ovarian tumors.

POTTER, HORATIO, D.D., LL.D., brother of Alonzo; b. Dutchess co., N. Y., 1802; graduated at Union college, 1826; ordained presbyter in the Protestant Episcopal church, 1828, in which year also he became professor of mathematics and natural philosophy in what is now Trinity college, Hartford; rector of St. Peter's church, Albany, 1838; on the death of bishop Wainwright, 1854, was elected provisional bishop of the diocese of New York; and by the death of bishop Onderdonk, 1861, became bishop of the diocese. The 25th anniversary of his consecration was celebrated by his diocese, Nov. 22, 1879, with a religious service in Trinity church, with a congratulatory address, and the presentation to him of a silver chalice and paten, lined with gold. On a subsequent evening a public reception was held in the academy of music, when the building was crowded with an assemblage in which were many men distinguished in church and state; and a model of the ark of the covenant of gold, silver, and steel, was presented to him by the diocese as a testimonial. Among the addresses were those by hon. John Jay and hon. W. M. Evarts, secretary of state.

POTTER, JOHN, D.D., an English scholar and divine, the son of a linen-draper of Wakefield, in Yorkshire; was b. in 1674; studied with great diligence and success at Oxford, where he took his degree of M.A. in 1694, and in the same year went into orders. He was appointed chaplain to queen Anne in 1706, professor of divinity at Oxford in 1708, bishop of Oxford in 1715, and finally in 1737 attained the highest dignity in the English church—the archbishopric of Canterbury. He died Oct. 21, 1747, and was buried at Croydon. Potter was really a superior scholar, but of the dull and plodding sort. Nowhere does he flash a ray of clear searching intelligence on his subject; his habit of mind is quite uncritical, and consequently his learned labors, though creditable to his industry, have added nothing to our knowledge, and have now "followed" their mediocre author into something very like oblivion. Potter's principal work is his *Archæologia Græca* ("Antiquities of Greece," 2 vols. 1698), superseded for many years by Dr. W. Smith's *Dictionary of Greek and Roman Antiquities;* besides which, however, we may mention his edition of *Lycophron* (1697), and of *Clemens Alexandrinus* (1715). As a church dignitary the linen-draper's son is said to have been haughty; he was likewise very "zealous" in matters ecclesiastical, a vigilant guardian of clerical interests, and strictly, perhaps we may even say excessively, orthodox.

POTTER, PAUL, one of the most distinguished masters of the Dutch school. He was b. at Enkhuyzen in 1625, and was the pupil of his father, Pieter Potter, an obscure painter. His progress was so rapid, that by the time he had attained the age of 15 his reputation as an artist was high. He left Amsterdam and established himself at the Hague, where, in 1650, he was married; in 1652, however, he returned to Amsterdam, at the solicitation of the burgomaster Tulp, who commissioned him to paint a great number of works; but his health, which was delicate, gave way under constant application at his easel, and he died before he had completed his 29th year. Paul Potter's cattle-pieces are perhaps more highly valued than pictures of that class by any other master, for none have combined and brought out with such admirable technical skill so many of the qualities that give a charm to such works. His pictures bring immense prices, particularly those painted between 1652 and 1654, when he died. Potter executed some admirable etchings.

POTTER, LOUIS JOSEPH ANTOINE DE, 1786–1859; b. Belgium; after a long residence in Germany, France, and Italy, returned to Brussels in 1824. For his opposition to the Dutch government, he was sentenced in 1828 to pay a fine of 1000 florins, and to imprisonment for a year and a half. During his imprisonment he composed a pamphlet on the *Union of the Catholics and Liberals;* and for this and other publications he was condemned in 1830 to banishment for 8 years. After the Belgian revolution, he was a member of the provisional government, upon whose downfall he withdrew to France. His best production is his *Philosophical History of Christianity.*

POTTER, ROBERT B., b. N. Y. about 1830; son of bishop Alonzo Potter, grandson of prest. Nott, left the practice of law which he had successfully established, and entered the army in 1861 as major in the volunteer force. He served with distinction in the battles of Roanoke island (where he led the attack), at Newbern (where he was wounded), Cedar Mountain, Manassas, Chantilly, and Fredericksburg. He took the stone bridge at Antietam, was wounded, went through the battle of Fredericksburg, and was made brig.gen. 1863. He commanded the 2d division 9th corps at Vicksburg, also, in the Tennessee campaign against Longstreet, and at the siege of Knoxville he held conspicuous positions. In the last campaign in Virginia he commanded a division under Grant; was made brev. maj.gen. 1864, and was severely wounded in the battle before Petersburg 1865.

POTTER'S CLAY, or FIGULINE, a kind of clay (q.v.); either slaty and massive, or, more generally, earthy; yellow, yellowish-white, gray, or sometimes greenish; adhering strongly to the tongue, and forming a paste with water. The earthy variety is sometimes very loose, sometimes almost solid. Potter's clay is a mineral of very common occurrence in alluvial districts, and sometimes occurs in beds of considerable thickness. It occurs in many parts of Britain. It is used in potteries for the manufacture of earthenware; the different varieties of it being adapted to different kinds of earthenware. Houses are built in Egypt of pots of this material. Potter's clay is also employed in agriculture for the improvement of light sandy and calcareous soils.

POTTERY. This term—supposed to be derived from *poterion*, the drinking-cup of the Greeks, and transmitted by the French word *poterie*—is applied to all objects of baked clay. The invention of pottery dates from the most remote period, and its application is almost universal—objects of pottery being in use among races even semi-barbarous. The art of molding or fashioning vessels of moist clay, and subsequently drying them in the sun, is so obvious, that it is not above the intelligence of the rudest savage. Hence, at the most remote antiquity, the Egyptians, to whom precedence must be assigned in this art, made bricks of unbaked or sun-dried clay, cemented with straw, which were quite sufficient for the purposes of construction in a country where little or no rain falls. These bricks, in shape resembling those in use at the present day, but of larger dimensions, were impressed, at the earliest period, with the marks of the brick-maker, and later, with the names and titles of the kings for whose construction they were made. The oppression of the Hebrews chiefly consisted in compelling them to work in the brick-fields—a task imposed on captives taken in war and reduced to slavery; and the fortresses of Pithom and Rameses, on the Egyptian frontiers, were made of bricks by the Hebrews. Kiln-dried bricks, in fact, did not come into use in Egypt till the Roman dominion, although some exceptional objects of the class of bricks have been found, such as a kind of conical plug, stamped on the base with the names of the tenants of the tombs. A few other objects were made in unbaked clay; but vases of baked earthenware were in use at the earliest period of Egyptian civilization, and are contemporary with the pyramids themselves. The Egyptians made a red ware, a pale-red or yellow ware, and a lustrous or polished red ware—the two first being used for vases destined for culinary and other purposes, the last for vases of more refined use, such as holding perfumes, wine, honey, and other delicacies. But the most remarkable Egyptian pottery was the so-called porcelain, made of a fine sand or frit loosely fused together, and covered with a thick silicious glaze of a blue, green, white, purple, or yellow color. This celebrated ware, the porcelain of the old world, sometimes exhibits the most beautiful tints of blue, a color which was produced by an oxide of copper, and which is still unrivaled. Objects were made of this material for the decoration of the dead and for the toilet. They were exported from Egypt to the neighboring countries, and are found alike in the tombs of the Greek isles, the sepulchers of Etruria, and the graves of Greece. Most of the figures of deities, the sepulchral ones deposited with the dead, a few elegant vases, portions of inlaying, objects of the toilet, and beads and other decorations, are made of this porcelain. Still finer work of this kind was produced by carving scarabæi and other small objects in steatite, and covering them with a blue glaze, so as to combine brilliancy of color with delicacy of execution. The Egyptians had at the earliest period the simpler manipulations and tools of pottery—the potter's lath or wheel, molds for stamping objects, and various other tools. On the decadence of the country under the Greeks and Romans, the pottery became assimilated to the Greek and Roman.

In the contemporary empires of Assyria and Babylon pottery was also in use at an early period. Sun-dried and kiln-dried bricks were made in the reigns of Urukh and other monarchs of the oldest Babylonian dynasties, about 2000 B.C. Platforms for elevating the larger edifices were made of them; and the bricks, like the Egyptian, were stamped with the names and titles of the monarch, to which was added the locality for which they were destined. Glazed bricks of various colors, occasionally enriched with scenes and ornamental designs, were introduced into constructions; and Semiramis is said to have adorned with them the walls of Babylon. The Assyrians and Babylonians employed this material for historical and legal purposes, making cylinders, hexagonal prisms, and purse-shaped objects of it, on which were impressed extensive writings. One of these remarkable objects contains the account of the campaign of Sennacherib against Judea and the tributes of Hezekiah. The Assyrian and Babylonian pottery resembles, but is not entirely the same as the Egyptian, being of a pale red ware, of thinner substance, finer paste, and more refined shape. At a later period, figures of deities were modeled in terra-cotta. The glazed ware of Babylon and Assyria is coarser than the finest Egyptian, and is the earliest example of the employment of materials for coloring like those now in use; the glaze, however, is silicious. The objects most remarkable for size are the large coffins found at Warka, supposed by some to be the Ur of the Chaldees, with oval covers, and ornaments of the Sassanian period. The potteries of Mesopotamia continued to flourish under the Parthian and Sassanian monarchs till the conquest of Asia by the Mohammedans.

The potter's art is mentioned in the Scriptures, but few specimens of Hebrew wares have been found. Some vases have been exhumed in Phenicia. The most remarkable pottery of antiquity was the Greek, which seems to have had another origin than the oriental. The terms *keramos* and *ostrakon* were applied by them to this material, and they made objects and vases in sun-dried clay, terra cotta, and glazed ware. The use of bricks was by no means extensive in Greece, although some public edifices were made of them. Their first use is attributed to Hyperbius of Crete, and Euryalus or Agrolas. The bricks were made by a mold (*plaision*) and were called after the numbers of palms-length. Some were so light that they floated on water. Besides bricks, tiles, cornices, artificial ornaments, friezes, pipes for conducting water, and drains, were molded in terra cotta. Statues and small figures, *pelinoi*, gaily and appropriately painted, covered with a *leucoma*, or white ground, and occasionally partly gilded, were in common use for votive and other purposes, and sold at a cheap price by the figurist (*koroplathos*). Dolls, cones, and various smaller objects were made by the potters; they were sometimes modeled, but more generally molded. The Greeks claimed the invention of the potter's wheel; and the principal cities contested the honor of the art, which is mentioned in Homer, and attributed to Corœbus of Athens, Hyperbius of Corinth, or Talos, the nephew of Dædalus. Numerous vases for all the ordinary purposes of life were made by it, and others of large form, decorated also by separate ornaments, *emblemata*, attached to them. Large casks or *pithoi* were modeled on a framework of wood. Great quantities of amphoræ, manufactured on the wheel, and used to contain the choice wines of Greece, were exported from Rhodes and other cities; and their débris are found in the

Crimea, Alexandria, Sicily, and other cities. Some of the earlier specimens of a glazed earthenware were painted with colors in fresco or encaustic, from which afterward came the more elaborate pictures of the glazed vases of Greece. To these succeeded two or three classes of painted ware, consisting of rude representations of animals laid upon the pale red ground of the clay in brown outline, a style prevalent at Athens and Asia Minor; which was followed by the potteries of Corinth, or the so-called Phenician or Egyptian style. The paste of the vases is of a light red or yellow, the figures in a black or moroon color, with portions enriched with crimson or purple; the backgrounds of a pale straw or lemon color; the animals, of a larger size than those of the Athenian vases, intermingled with chimeras and other monsters; the backgrounds variegated with flowers—the whole derived from oriental art. Gradually human figures, with all the characteristics of archaic Greek art, were introduced, with accompanying inscriptions, which cannot be later than the 6th or 5th c. B.C. The subjects of these vases were derived from the oldest Greek myths. The style of this pottery by degrees improved: the paste became pale red or salmon color; the human figures, which had been at first subordinate, replaced the friezes of animal and large ornaments. As the improvement went on, the backgrounds were made of a bright orange-red color, the figures of a deep black; while portions, as the hair, garments, and flesh of female figures, were colored white. The style of art became much freer, although still retaining the rigidity of the Æginean school. Names of figures represented, of the artists who painted and the potters who made the wares, were added, with speeches, and the names of celebrated beauties and athletes of the day. In these styles the vases made on the wheel appear, while yet soft, to have had the subjects traced upon them with a finely-pointed tool; the figures were then filled in with a lucid black pigment of manganese, and then returned to the furnace. The details of the muscles and other portions were incised through the back with a sharp tool, so as to show the lighter background, and the purples, crimsons, blues, and other colors were laid on. The subjects are chiefly derived from the war of Troy and the heroic age; and the shapes in use were oil-jars (*lecythoi*) water-pails (*hydriæ*), wine-vases (*crateres*), wine-jugs (*œnochoæ*), and *amphoræ*. They seemed to have continued in use till about 450 or 420 B.C., when the red figures were substituted for black, by tracing, as before, the figures on the clay, then running round them a thick line of flock, and finally filling up the background entirely with a black color—the muscles and inner marking not being incised, but traced in black and brown outlines. The earlier vases of this class, which are of the strong style, resemble those of the black figures; but the style gradually improved, and resembled the art of Phidias and Zeuxis; while the letters are those in use after the archonship of Euclid, 403 B.C. The style and form of these vases altered according to the art of the period, till the ultimate disuse of fictile or painted ware, about 300 B.C., when the conquests of Alexander the great and the increase of luxury caused it to be superseded by vases in metals. In its last stage, the pottery became molded, and was glazed entirely black, or else variegated with opaque white figures and ornaments. The subjects of these later vases differ considerably from the earlier, being chiefly derived from the theater or myths of the later poets. Vases of this description are found in Greece, the isles of the Archipelago, and Italy; into which latter country they appear to have been imported from Greece.

In Italy, indeed, the Etruscans, at an early period, and perhaps some of the principal cities in Magna Græcia, manufactured their own pottery. That of the Etruscans consists principally of three kinds—an unglazed red ware; a lustrous brown ware, made also by the neighboring Sabines and Oscans; and a black ware, the paste or substance of which is black throughout, not superficial, as among the Greeks, and made by mixing some coloring material with the clay. The Etruscan pottery is rarely painted—the black ware never—but it is distinguished by having ornaments in salient and bas-relief modeled or molded on it, and by the shapes of the vases apparently being derived from works in metal, and reproducing the fantastic combinations of oriental art. This ware, which was in use from 500 to 320 B.C., was the source from which subsequently arose the Aretine and Roman pottery. It was ornamented sometimes with incised ornaments; the subjects, however, are generally uninteresting, and it never attained a high position in art. The Etruscans, however, in later times imitated the painted vases of Greece, but their clay is much paler, the drawing coarser, and the shapes less elegant. In terra cotta statues they particularly excelled, and supplied the Romans with the figures of their divinities. Even sarcophagi were made of this material.

On the decline of the pottery of the Greeks and Etruscans, a new kind of ware was made at Arezzo, or Arretium, to which has been given the name of Aretine, and which resembled the later ware of the Greeks. It is evidently imitated from works in metal, in all probability from the chased cups of silver and gold which began to come into use in Italy, and was a continuation of the later molded wares of Greece and Italy. The vases were of a bright red or black color; the paste uniform in color throughout, but covered with a lustrous siliceous glaze. The red color nearly resembles in color and texture a coarse sealing-wax; the paste is often remarkably fine. The vases, generally of small dimension, were turned on the lathe; the ornaments were molded separately, and attached to the vase: patterns were produced by the repetition of the same mold, or by placing bas-reliefs from various molds on the vases. This kind of pottery was first made at Arezzo, but subsequently, or nearly simultaneously, was produced at Capua and

Cumæ in the 1st c. A.D. It afterward extended over all the Roman world, and was made in Gaul and Germany. It was called Samian ware under the republic, and was at first extremely fine, but deteriorated under the last of the twelve Cæsars, and is no longer found under the Antonines; a red ware, glazed with red-lead and copper, having been substituted for it. The names of several hundred potters are found stamped upon extant specimens of this ware, and some of them are evidently of Gaulish or British origin. These names are followed by F., *fecit*, or made; M., *manu*, or by the hand of; and OF., *officina*, or establishment. The ware was extensively imported into Britain and the remoter provinces of the empire; and wherever found, shows the influences of Roman civilization. Furnaces for it have been found in France and Germany, but not in England. The other kinds of Roman ware were local, evidently made upon the spots where found, but with inferior ornamentation. Black-ware seems to have succeeded this, and to have been produced by confining the smoke of the furnace, and throwing it down upon the heated ware. In Britain varieties of this ware were made at Castor, in Northamptonshire, ornamented with bas-relief, laid on by the process of depositing a fluid clay on the wet ware, and molding it with a tool. The style of art is Gaulish. Other vases of glazed ware were manufactured at Upchurch, near Rochester, and at Crockhill in the New Forest. They have only a few ornaments, either stamped or painted in a white pipe-clay on the surface. These vases are probably as late as the 3d c. A.D. Later arose a black-ware, generally bottles or jugs, glazed externally, and with single words, invitations to drink, painted on them, in a white pipe-clay. Many varieties of unglazed ware, red, yellow, white and gray, were extant in the 2d and 3d centuries. The large culinary and other vessels were made of these—such as casks (*dolia*), *amphoræ*, jugs (*lagenæ*), and mortars (*mortaria*)—the last at Lyons. The Romans made great use of brickwork terra cotta. All over the empire bricks were made for public and private buildings, and stamped at Rome with the name of the proprietors of the land, the potters, and the consulate of the period, till the middle of the 3d c. A.D. Bricks were also extensively manufactured by the legionaries, and bear their names and titles. The graves of the soldiery were often constructed of them. At Rome, the last inscribed bricks are those of Theodoric; none so late have been found in Britain or Gaul. Tiles, cornices, roof ornaments, and gutters were formed of terra cotta; so were the votive figures offered to the gods; but they all disappeared at the invasion of the northern barbarians, although they continued till then to be manufactured by local potteries.

Among the northern nations, especially the Celts and Scandinavians, long prior to the Roman conquests of Gaul and Britain, at the remote age of the stone and bronze periods, large and small vases, perhaps originally employed for domestic, but subsequently for mortuary, purposes, are found amongst the cromlechs, the tumuli, and graves of northern Europe. They are formed of a coarse clay, mixed with small pebbles, and have been feebly baked by surrounding them with hay, dried ferns, or other combustible vegetable matters, which have been burned inside and around them. The interior of the walls is black; the exterior, of a pale brown color. Their mouths are large, the ornaments, hatchings, and rude line sometimes making an elaborate pattern or tattooing all over the vase. Those from Britain were called *bascaudæ*, or baskets, by the Romans. A modification of this class of ware was continued under the Saxons and Merovingians, and is distinct from the Gallo-Roman and Romano-British potteries; the clay being better baked, and the ornaments, stamped or impressed from a mold, more regular. The use of pottery among these races was to a great extent superseded by glass, metal, and other substances for drinking and culinary vessels, and few or no specimens of medieval unglazed vessels are known. Terra-cotta, indeed, continued to be applied for making figures from the 14th to the 18th c. in Europe; but in England even the use of bricks, a manufacture difficult to have been lost, was restored by Alfred. Unglazed ware was, in fact, superseded or abandoned in Europe after the fall of the Roman empire; but in modern times the use of terra-cotta and such like ware is found extended all over Europe, Asia, and Africa, varying in texture and excellence from the coarse flower-pots to the thin and graceful water-bottles of the Arabs and modern Egyptians. Even the Nigritic races continue to manufacture a feebly-baked earthenware, rudely colored with pigments not baked on the ware. In the new world the existence of unglazed earthernware seems to date from the most remote antiquity. The vases and other objects found in the northern portions of America, indeed, are of the rudest kind, and bear a striking resemblance to those of the early Scandinavian, Celtic, and Teutonic graves, in paste, shape, and ornamentation. The Mexican and Peruvian potteries, however, evince a much greater mastery of the art, and both are modeled with great spirit, gayly colored, and profusely ornamented. Some of the oldest Peruvian wares, indeed, rival in their modeling European art, but they never attain to glazing. The other unglazed wares of the new world differ according to the localities where they have been manufactured, and in the most highly-civilized portions reflect or rival the arts of the people by which it has been colonized. Those of the existing native races are very feeble, and the processes are sometimes accompanied by magic ceremonies. The pottery of the southern hemisphere is quite recent, as none of the races seem to have been acquainted with the art. The Fijis, indeed, have a ware glazed with the resin of a tree, but it appears to have been derived from Europe.

The knowledge of glazes originally acquired by the Egyptians and Assyrians was continued under the Roman empire at Alexandria, and appears to have been transmitted to the Persians, Moors, and Arabs. Faiences, and enameled bricks, and plaques were in use among them in the 12th c., and among the Hindus in the 14th c. A.D. The Moors introduced into Spain the use of glazed tiles about 711 A.D., examples of which, called *azulejos*, as old as the 13th c., are found in the Alhambra. Besides these, the manufacture of glazed or enameled faiences in Spain, distinguished by a metallic iridescence, came into use from the 13th c. in Spain. In Italy they are supposed to have been introduced as early as the conquest of Majorca by the Pisans, 1115 A.D.; but the first appearance of Italian enameled faience, the precurser of modern porcelain, does not date earlier than about 1420, when it was used for subjects in relief by Lucca della Robbia. About a century later plates and other ware were manufactured at Pisaro and Gubbio, decorated with subjects derived from the compositions of Raphael and Marc Antonio, painted in gay and brilliant colors. But the establishment was abandoned in 1574, although pieces of *majolica* continued to be fabricated in various cities of Italy till the 18th century. From Italy this enameled ware passed into France in 1590 with Catharine de Medici, where it was manufactured till the end of the 17th century. In 1555 the celebrated Palissy discovered at Saintes the art of glazing or enameling a gray paste, and introduced dishes and other objects with fruit, fish, and animals, molded from life, distributed over the surface, as a kind of ornamental ware. At the same time, or earlier, was made what is called Henry II. ware, and which is now so precious, consisting of glazed white ornamental pieces. Glazed or Norman tiles, however, as they are called, date from two centuries before. At the close of the 13th c. glazed ware was made in Alsace; but it was not till two centuries later that majolica was fabricated at Nuremberg; and the manufacture was continued in various parts of Germany till the 18th century. Delft, which gave its name to its own fabric, is said to have produced a glazed ware as early as 1360, and continued to do so till the 19th century.

Holland was chiefly celebrated for its bottles of stoneware, glazed by salt, called bellarmines, graybeards, or bonifaces, and for its tankards, which were imported all over Europe, in the 16th c., and are repeatedly found in London excavations. In England glazed tiles for religious purposes were made by the monastic orders from the 12th to the 16th c.; and glazed bottles, jugs, and cups are found of the time of Henry II.; while Edward III. favored the establishment of potteries in England. The English wares, however, were superseded by Delft and Dutch stonewares till the close of the 17th c., when the coarse wares made at Burslem were improved by the discovery of salt and other glazes. Some Germans, named Elers, from Nuremberg, settled there, and produced an improved ware called the red Japanese; but finding that the secret was discovered by Astbury, left for Lambeth, where they established themselves in 1710. From this period various improvements were introduced by Astbury, Booth, and finally by Wedgwood, who discovered more suitable clays in 1759, and called to his assistance the arts of design, by the employment of Flaxman for bas-reliefs and figures. The applications of copper-plate printing and gilding were subsequently discovered. Still later, other materials, as felspar and bones, were used in the composition of this pottery. Delft-stone and other wares were made at different places, as Liverpool, Lowestoft, and elsewhere; but, after different vicissitudes, most of the potteries have disappeared, except those of the stoneware at Lambeth and Vauxhall.

None of this ware, however, was of the nature of the Chinese porcelain which had been imported by the Arabs in the 13th c., was known in Italy in 1330, and was imported into France as early as 1370, and into England much later. The name porcelain, from *porcellana*, an obscure Portuguese word, supposed to mean a shell, is applied to a mixture of alumina or *kaolin* and silex or *petuntse*, which, when baked, does not fuse at a temperature as high as 140° of Wedgewood's pyrometer, and the glaze of which is incapable of being scratched by a knife. This porcelain, called "hard porcelain," is said to have been invented at Sin-ping in China, about 185 B.C., and rose to great importance at King-te-chin, 557 A.D., where, in 1712, 3,000 furnaces were in activity, and where the manufacture is still carried on. There are about 18 renowned potteries in the empire. The art of pottery in China is said to be as old as 2599 B.C. In Japan, hard porcelain dates from 27 B.C.; translucent porcelain was made about 672 A.D.; but between 1211 and 1221, Kotosiro, a Japanese potter, went to China to improve his process. There are 18 celebrated potteries in Japan; and in modern times, the pieces exported come chiefly from Imali, in the province of Fizen. In 1644, the Dutch exported 44,943 pieces from Japan. At the beginning of the 16th c., the porcelain of China began to be extensively imported into Europe, and various unsuccessful attempts were made to discover the secret of its manufacture, but without success, both as to the material and the process. The Persians, indeed, are said to have produced translucent pottery about the 15th c. A.D.

After some trials, which resulted either in the production of a kind of opaque glass or stoneware, Böttcher or Böttger, an alchemist (who had been seized by Frederick Augustus II. in 1701), after Schnorr, in 1709, had discovered white *kaolin* at Aue, produced from it a white hard porcelain at Meissen, near Dresden; and the porcelain establishment there was founded under royal auspices. Extraordinary precautions were taken to prevent the process being discovered, by imposing oaths upon the workmen, and the process there pursued was not communicated till 1812 to Brongniart. The secret, however, was betrayed by Stöfzel, a workman of Meissen, who fled to Vienna in 1720, where an imperial establishment was founded, which exists to this day. Other workmen carried the secret from those establishments all over Germany. Royal works were set up at Berlin in 1755, at St. Petersburg in 1744, and at Munich in 1758. From this period, two different kinds of porcelain were made in Europe, a soft and a hard. In France, soft porcelain was made at St. Cloud in 1695, and was not discontinued till 1804. The accidental discovery, by Mme. Darnet, of *kaolin* at St. Yrieix la Perche, in 1765, led to the production of hard porcelain at Sèvres, where, after 1800, only this kind was made. Various places in France made both kinds; and in Italy, both were produced at La Doccia, near Florence, at Capo di Monte, near Naples, and at Venice. Other establishments flourished at Madrid and Oporto, established in the 18th century. The manufacture of soft porcelain appears to have been introduced in England, at Bow, as early as the 17th c., and the Chelsea works were set up still earlier, according to some, by Elers. Thence the art was transferred to Derby in 1748; and an establishment at Worcester, founded in 1751 by Dr. Wall, is said to have first printed on porcelain. Hard porcelain was made by Cookworthy at Plymouth in 1705, and afterward at Bristol, but was subsequently abandoned as unprofitable, although again made by Minton in Staffordshire in 1850. One of the last inventions in porcelain has been the introduction of Parian, or statuary, used for the production of small figures and statues, by Copeland and Minton. Among the oriental nations, the production of porcelain seems limited to China and Japan, although fayences and glazed wares are manufactured all over the east. The production of a white porcelain, either soft or hard, capable of being molded and painted with various colors, effected a revolution in the ceramic art: sculptors were employed to mold small figures and other objects by the different establishments, and the vases, which at first were decorated with rude copies or poor imitations of their Chinese originals, by degrees introduced on their surfaces the art of the country where they were made. The paintings on porcelain thus resembled those on enamel, and when the pieces were of considerable dimensions, and painted by distinguished artists, became of great value. Thus, copies of works of Raphael and of Tintoretto, in the exhibition of 1851, were valued at £1000 and £880. Even ordinary cups, when painted with vignettes, have their value much augmented. So also the application of delicate colors, as blue, green, and rose-pink, added a charm not found in the monochrome glazed ware of the middle ages. For these, Dresden and Sèvres were formerly unrivaled; but the colors of late years have been changed, and do not equal the old. The style of art has varied in each century; the old rococo shapes having been superseded at the commencement of this century by classical shapes, and again by modified mediæval forms. The present age has been distinguished by an attempt to reproduce *majolica*, *palissy*, and other wares; by the improvement of printing in colors; by the invention of statuary porcelain, and an application of the material to other purposes, as buttons, stamped or pressed from a mold or die. Besides the ornamentation of vases, a trade-mark is often added, either stamped in or painted on the ware. This, on the early majolica, had the date, place, and name of the artist; but the Dresden, Sèvres, Chelsea, and other establishments introduced devices, monograms, arms, etc., as swords, anchors, crowns, and other devices. The Chinese has devices, mottoes, names of makers, and the date of the reign when made, commencing with the first monarch of the Ming dynasty about 1480, generally in red color, and imitating the seals or stamps used for sealing documents. These marks are continued to the present day.

Brongniart, *Traité des Arts Ceramiques* (8vo, Paris, 1844); Birch, *Ancient Pottery* (1858); Marryat, *Pottery* (2d ed., 1864); Jacquemart and Le Blant, *Histoire de la Porcelaine* (1862); Eliza Meteyard, *Wedgwood and his Works* (1873); the reports of the exhibitions at London (1851–62); Paris (1855–67–78); and Philadelphia (1876).

Manufacture.—The dough-like condition into which clay can be worked with water, and the hardness it may be made to acquire by burning, are qualities which have been turned to account by man from the earliest times, and it is upon these that the potter's art essentially depends; but there is great variety in clay, and it is only by knowing something of its nature and constituents that any real advance has been effected in pottery. If a piece of clay be examined, it will be found that it consists of exceedingly minute particles, held together by aggregation when moist; but if dried it can be easily reduced to an impalpable powder by mere pressure; and if, instead of drying, we add an excess of water, it may be so mixed and held in suspension in the water that it appears almost to be dissolved. In time, however, it is deposited as a sediment, and when the excess of water is removed, it is a soft tenacious paste, which is so non-elastic that it will retain the smallest impression made in it without change. This minute division of its particles, and the absence of elasticity, are its most valuable qualities. But all clays are not of the same purity and quality; the commonest is that of brick fields, which is one of the most abundant substances in nature; but it is so mixed up with iron and other foreign ingredients that, except for bricks, tiles, and the coarsest kinds of pottery, it is not used.

The purest kinds of potter's clay are called *kaolin*, and are believed to have been formed by the decomposition of rocks containing large proportions of feldspar, a slightly variable compound substance, which, in general terms, may be said to be a combination of neutral silicate of alumina and the silicates of potash, soda, lime, or magnesia, together or singly. Certain kinds of granitic rocks, especially the whiter varieties, by their atmospheric decomposition, yield fine kaolin. Great experience is required in selecting and using the materials, because in nature the plastic materials are very irregularly mixed with other substances, which have a more or less deteriorating effect. Most of the best-known clays contain a certain portion of free silica in addition to that in combination as natural silicate, which requires to be removed for very fine wares by boiling in caustic potash, otherwise, it proves injurious. The finest china-clay of Great Britain is obtained from Cornwall, where the decomposed granite is washed by streams of water, which carry it away into ponds called *catchpools*. The discovery of this source of china-clay was made by Mr. Cookworthy about the middle of last century, and alone afforded means for improving our native pottery, which were most admirably turned to account by Mr. Josiah Wedgwood, and after him, by Mr. Herbert Minton, Mr. Copeland, and others. Previous to this, although as before noticed, fine pottery was made in Britain in two or tree places, yet the general character of our pottery, which was chiefly manufactured in the neighborhood of Burslem, in Staffordshire, was most miserable both in material and design. The clay was inferior in color, prepared with very little care, and covered with a coarse white or yellow lead glaze; but the discovery of the Cornish clay by affording a material of excellent quality, stimulated the manufacturers to improve the general style of their manufacture. Scarcely second in importance to this discovery was Wedgwood's good taste and untiring zeal in working out that revolution in the art of the British potter, that has led to its present enormous development. In 1730, when Wedgwood was born at Burslem, in Staffordshire, that place supplied the greater part of the common household pottery of Great Britain; but so small was the trade, that it was but little more than a village encumbered with heaps of broken crockery, and its environs disfigured with clay-pits and piles of refuse: now it is the center of a populous district called "The Potteries," comprising about 48 sq. miles. In this limited space there are now nearly 280 kilns at work, employing more than 100,000 operatives.

The method pursued in making pottery and porcelain is the same in principle everywhere; we shall, therefore, give the general outline of the process without entering into the minute differences which distinguish the variations produced by different manufacturers in this and other countries. Pottery and porcelain differ chiefly in this, that the superior quality of the materials used in making the latter, gives it a peculiar translucency. For pottery, inferior materials are used, and a considerable admixture of calcined flint, bone-ashes, or native phosphate of lime, are added to the clay. The use of the calcined flint was said to have been first adopted by a Burslem potter named Astbury, who, while traveling to London on horseback, in the year 1720, had occasion in passing through Dunstable, to seek the assistance of a hostler in consequence of some disease in his horse's eyes. He noticed that the man took a piece of flint, burned it, and then reduced it to a fine powder, which he blew into the horse's eyes. Astbury noticing the beautiful whiteness of the powder, conceived the idea of using it in his pottery; and did so with great success.

The ingredients, such as the clay and calcined flints, are ground by separate means; the former in the pug-mill. This is an upright, iron-bound, wooden cylinder, with an axis turned by machinery; projecting from the axis are 7 arms, each of which has 8 knives fixed in it, with the points outward, and so arranged that they spread over the largest amount of space in the interior; and altogether they are placed in a spiral manner, so that when in motion, the clay which is thrown in lumps into the hopper-shaped upper part of the vat, is worked down, and is so cut and kneaded by the knives that it is forced out at an opening at the bottom, in the state of soft pap. This is aided by the knives on the lower part of the lowest arm being connected together by a plate, which prevents all settlement at the bottom. This pap-like clay passes into a large wooden tank, in which it is agitated with water until quite incorporated so as to resemble milk in color and consistency. In another mill, of a different construction, the Cornish granite and calcined flints are being reduced to a somewhat similar state. This mill is very strongly constructed, and consists of a tub-like vat, in the center of which turns an axle moved by machinery; in the bottom of the vat is a thick stone-bed, consisting either of chert or horn stone. From the upper part of the axis 8 strong arms project like the spokes of a wheel; and strongly attached to these are stout beams pointing downward, and nearly touching the stone-bed. As the axis, with its arms and beams, turns round, the beams push some large masses of the Cornish granite or of chert stone round with them, and these triturate the calcined flints and other hard materials, and stir up the water with which the vat is kept constantly supplied, while it overflows in a milky state, charged with the finely divided materials, into a cistern, where it is kept stirred until it is sufficiently supplied with the solid materials, and the thickened milky liquid is then drawn off, in proper proportions, into a vat to which the prepared clay is also passed. The mixture of the two is then allowed to subside until the water is nearly clear, when it is drawn off; and the sediment is deprived of its surplus moisture, either by evaporation, or, in the best works, by a pneumatic-exhausting apparatus, which does it very quickly. The composition is then a fine plastic material of the consistency of tough dough, and is ready for the potter's use. In preparing the finer materials for porcelain many other operations are required, all, however, having the same object, viz., the extremely minute division of the substances used.

The prepared clay is taken to the *throwing-machine*, or *potter's lathe*, which is represented in fig. 1. This consists of a fixed table A, through which passes the axle B, and rises a little above its surface. and having on its upper end, a disk C, which revolves with it. The axle is put into rapid motion by turning the fly-wheel D, either by hand or machinery; and this causes a rapid revolution of the disk C, upon which is placed the soft mass of clay to be molded. At E is seen an upright, with a small sliding-bar regulated by a screw; this is the guide for the potter to regulate the height of the vessel he is making. When the lump of clay is revolving, the potter, with his hands or with proper tools, fashions it into any shape he pleases; his management of this requires considerable skill, as nearly every article requires a different configuration. But some articles are formed in molds, the molds being made of plaster of Paris. This answers well for fine porcelain intended to be very thin, because the plaster-mold absorbs much of the moisture in the paste, and thus partially dries it, so that it admits of handling, which in a softer state would be very difficult. The paste is used so liquid that it can be poured into the molds. It is usual, in casting, to have a mold for each part. For nearly flat articles, such as dinner-plates, a plan is adopted which combines both processes: a mold, usually of plaster, Fig. 2, *a*, is placed on the disk of the throwing-wheel, *b*, and a thin layer of the paste is pressed on to it, so as completely to take its form; then to the guide-post, *c*, is attached an arm, *d*, with a small brass plate, *e*, on its lower side. This plate is cut to the outline of half the plate, or dish; as it revolves, this pares down and shapes the clay to its own outline, and to the thickness to which it is set, there being an arrangement on the arm of the guide-post by which this can be effected. Sometimes, as in the case of deep vessels, molds are used for the exterior, and the interior is formed by the hand. This process insures certainty of size and shape, which is important in making large numbers of similar articles, as tea-cups, etc. The mold is lined with a thin cake of clay, and when placed on the revolving disk, it is fashioned inside by hand, and finished off with a wet sponge. Sometimes metal or horn tools are used for producing moldings and other raised ornaments, or for grooves, when the turning or throwing wheel is used. If the articles made require handles or other similar accessory parts, they are always molded, unless of very simple forms, and are attached whilst they and the body are still soft enough. They are joined by a thin fluid paste called a *slip*, and the junction is smoothed over with the wet sponge, which is one of the most useful of the potter's tools. Being formed, the articles, of whatever kind, are now taken to the drying-stove, where they are placed on shelves, and remain there some time, exposed to a heat of about 85° Fahr. When quite dry, they are next taken to a workshop near the kiln, and they are here carefully packed in coarse earthenware vessels, called *seggars*, which are so made that they can be piled upon one another to a great height in the kiln, as seen in fig. 3, in which some of the seggars are seen in section, for the purpose of making the arrangement more intelligible. As the seggars are generally made large enough to hold a number of articles, which would, when highly heated, adhere if they touched, a number of curiously-shaped pieces of burned clay are used for placing between them, so as to make them rest on points; these are called *watches*, *cock-spurs*, *triangles*, *stilts*, etc. Another object is gained by this, in burning flat articles such as plates: these, if placed one upon another, would not be fired equally; but, when they are held apart, the heat affects all parts alike. The seggars are so piled in the kiln that the center is hollow, and there are free spaces between them through which the fire can ascend; props, *a*, *a*, *a*, fig. 3, being so placed as to keep them from immediate contact with the sides all round. Thus each seggar forms a small oven, in which one or more pieces of pottery or porcelain are baked, and the seggars prevent any unequal heating of the pieces, and also protect them from smoke. A kiln has generally eight furnaces, and it is usual to raise six piles of seggars between every two furnaces, or rather between their flues, which rise to a considerable height in the kilns. Each pile of seggars is technically called a *bung*, so that there are generally 48 or 50

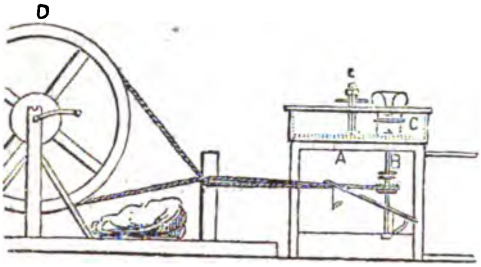

FIG. 1.

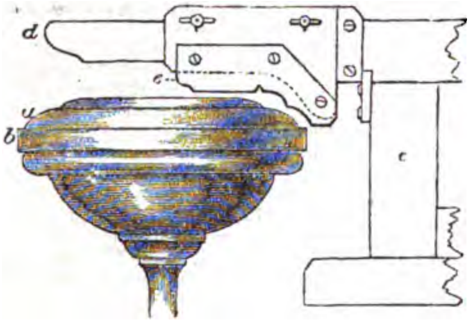

FIG. 2.

bungs to the charge of a kiln. When all this is arranged, the furnaces are lighted, and great care is taken to have the best coal, as it enables the manufacturer to make a more certain calculation as to its effects, and is less liable to smoke and sulphureous vapors, which might injuriously affect the contents of the kiln. The baking or firing requires great care and attention, and there are many nice regulations connected with it to guide the workmen. It usually lasts from 40 to 42 hours. The fire is then allowed to go out, and the kiln to cool very gradually, after which it is opened and the seggars removed, to be unpacked in a separate workshop. The articles are now in the state called biscuit-ware, and require both the glaze and any patterns they may be intended to bear. Common pottery is often figured by printing the design in enamel colors on paper, and whilst the printing is still wet, applying it to the biscuit-ware; the ware absorbs the enamel ink, and the paper is removed by water, leaving the pattern on the ware. It is then fired in seggars, or a muffle, to fix the color, and is then dipped into composition called *glaze*, of which three kinds are used in the Staffordshire potteries. The first, for common pipe-clay ware, is composed of Cornish granite, 16 parts; flint, 36 parts; white-lead, 53 parts; and cullet, or broken flint-glass, 4 parts. These materials are triturated with water, with the same care and by similar means to those employed in forming paste, and are reduced with water to the same milk-like liquidity. Each workman has a tub of the glaze before him; and as the articles of biscuit-ware, either with or without decorations, are brought to him, he dips them in the glaze, so as to insure a uniform coating over them; and, by nice management, he prevents any large drops or accumulations on one part more than another. The porous biscuit-ware rapidly absorbs the moisture, and dries up the thin film of glaze on the surface of the articles, which are again placed in seggars, and carried to the glaze-kiln, where they undergo another firing, which melts the glaze, and converts it into a perfectly transparent glass, like water, all over the surface, and renders any pattern previously printed upon it very plain. The temperature in the glaze or enamel kiln is only increased very gradually, and is kept up for about fourteen hours, after which it is allowed to cool slowly, and the articles are taken out completed. So far, this description has applied to the manufacture of pottery and porcelain on a large scale, for general purposes; but when it is applied to more costly and artistic works, very special arrangements are required: and in the case of remarkably fine pieces, instead of the huge kilns, which hold frequently many thousand pieces, muffle furnaces are both used for the biscuit, the glaze, and the colored and gilded decorations, which, in porcelain, are applied on the glaze, and not on the biscuit.

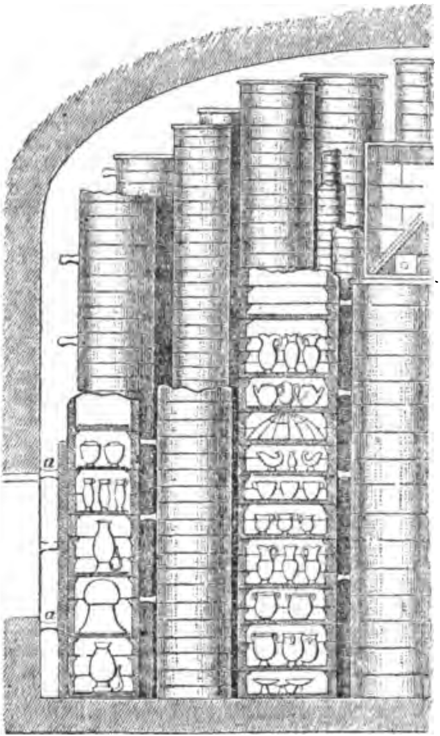

FIG. 8.

The decoration of porcelain has long held a high rank as a fine art; and the exquisite skill shown in some of the finest works of the continental manufactures, and lately in those of Britain, has fairly entitled it to that rank. The colors employed are all colored glasses ground to impalpable powders, and mixed with borax or some other fluxing material; for use they are generally made liquid with oil of spike, and they are laid on with hair-pencils in the same way as oil-colors. The whole process is exactly the same as in painting or staining glass; the glaze on the biscuit-porcelain being true glass, and the enamel colors being exactly the same as those used by the glass decorator. The colors may be made by mixing the materials of which glass is made with the coloring material and the flux, or simply with the already colored glass and the flux. When the former plan is employed, the following are the coloring materials employed: oxide of chromium for green; oxide of iron for red, brown, violet, gray, and yellow; oxide of uranium for orange, yellow, black; oxide of manganese for violet, brown, black, and purple; oxide of cobalt for blue, gray, and black: oxide of antimony for yellow; oxide of titanium for yellow; oxide of copper for green; suboxide of copper for red; sesquioxide of iridium for fine black; protochromate of iron for brown; chromate of lead for yellow; chromate of barytes for yellow; chloride of silver for deepening reds and purples; purple of cassius for ruby and purple. Several of these colors are much increased in brilliancy by the addition of oxide of zinc, which of itself gives no color, and the transparent ones are rendered opaque by the addition of oxide of tin.

Other fluxes besides borax, or borate of soda, are used, as sand, feldspar, boracic acid, minium or litharge, salt, saltpeter, potash, and soda. Nothing enriches the appearance of porcelain more than good gilding; for this purpose gold-leaf is rubbed down with oil of turpentine, or pulverulent gold is produced by precipitating a solution of gold in aqua-regia, by the addition of a solution of sulphate of iron. The gold is precipitated as a brown powder, which is washed and dried; and then worked up with one-sixteenth of its weight of oxide of bismuth and oil of turpentine. It is painted on, then fired, and afterward burnished. Peculiar and beautiful metallic lusters are produced upon pottery by precipitated platinum and other means; but it is not within the scope of this article to enter into all the details by which the almost numberless variations are produced in the manufacture and decoration of this material. The literature relating to its history is rich in treatises for the guidance of those engaged in the art.

The following are the chief varieties of ceramic materials and their usual composition: 1. *Porcelain.*—At Sèvres, kaolin, 48 parts; sand (pure white), 48 parts; chalk, 4 parts. At Dresden, kaolin, 62 parts; feldspar, 26 parts; broken biscuit-porcelain, 2 parts. At Berlin, kaolin, 76 parts; feldspar, 24 parts. In England three mixtures are used: For common china, ground flints, 75 parts; calcined bones, 180 parts; china-clay, 40 parts; clay, 70 parts. For fine china, ground flints, 66 parts; calcined bones, 100 parts; china-clay, 96 parts; Cornish granite, 80 parts. Fine, for modeling figures, etc., Lynn sand, 150 parts; calcined bones, 300 parts; china-clay, 100 parts; potash, 107 parts. The glaze requires to be varied for nearly all, so that their fusibility may be greater or less, according to the more or less fusible character of the biscuit ingredients. 2. *Parian.*—The composition for this is the same as that for the fine English china, but it is used in a liquid state, so as to be poured into the plaster of Paris molds. It requires very great care in the firing. 3. *Earthenware* (Fr. *Faïence*, from Fayenza, the name of a place in Italy where it was made; Dutch, *Delft*, from its having been chiefly made at Delft, in Holland).—Made of various kinds of clay, varying in color from yellow to white, according to the quality required; and more or less of powdered calcined flints are mixed with it to give it body and hardness. Sometimes, as in porous vessels, only clay is used. 4. *Stoneware*, such as is used for jars, bottles, drain-pipes, etc., is made of several kinds of plastic clay, mixed with felspar and sand, and occasionally a little lime, but the materials vary much in different localities.

In Great Britain the potteries not only supply the home demand, but also export to a greater extent than any others in Europe; and so rapid and extensive have been the improvements effected in the last ten years by British potters, that both as a manufacturing and as an artistic country Great Britain now stands foremost. In 1875 the exports of earthen and china ware, parian and porcelain (except red pottery and brown stoneware) amounted in value to £1,745,078. The largest quantities are sent to India, North America, and Australia. In North America, however, the manufacture of pottery is carried on with great activity in Jersey City, Philadelphia, Liverpool (in Ohio), and other places.

Most of the celebrated manufacturers of pottery and porcelain, both at home and abroad, have employed a special mark to distinguish their works, and these are now of considerable importance in enabling us to ascertain the origin of choice specimens.

POTTINGER, Sir HENRY, 1789–1856; b. Ireland; went to India in 1804 as a cadet in the Bombay service; was employed for 7 years as judge and collector at Ahmednuggur in the Deccan, and political resident the following 15 years at Cutch and Scinde. In 1840, returning to England, he received a baronetage; and in 1841, war having broken out between England and China, was sent to China as ambassador extraordinary and minister plenipotentiary to settle the differences in regard to the opium trade, and as superintendent of British trade. He concerted measures with admiral Parker, the result of which was the taking of Amoy and other important places, and the concluding of a peace which opened the great ports to all nations. For these services he was made a knight grand cross of the order of the Bath in 1841. In 1843 he was made governor and commander-in-chief of Hong-Kong, and on his return to England in 1844 the office of privy councilor and a pension of £1500 were conferred upon him. In 1846–47 he was governor of the cape of Good Hope. In 1848 he was governor and commander-in-chief of Madras until 1854. He died at Malta.

POT'TO. See KINKAJOU.

POTTS, GEORGE, D.D., 1802–64; b. Philadelphia; graduated at the university of Pennsylvania, 1819; studied theology at Princeton; ordained as an evangelist, 1823; pastor of the Presbyterian church at Natchez, Miss., 1823–35; of Duane Street church, New York, 1836–44; and of University Place church, 1845–64. He was an eminent preacher of commanding presence, oratorical manner, flowing style and practical aim. Though drawn into a controversy with Dr. Wainwright by the pamphlet entitled *No*

Church without a Bishop, he was always kind and fraternal in his deportment toward Christians of all denominations. He published numerous sermons and addresses.

POTT'S DISEASE, an affection of the spinal column named after Dr. Percival Pott (q.v.), the surgeon who first accurately described its condition and nature. The disease is otherwise called angular curvature of the spine. It is caused by inflammation of the bodies of the vertebræ and of the intervertebral substance, usually commencing in the latter. It is commonly regarded as essentially a scrofulous disease, and it is often attended by development of tubercle in the affected part, accompanied by caries of the bony substance of the vertebræ, the giving way of which causes the curvature of the column. Its most common period of development is childhood and youth, while the body is growing. Spinal abscess, or the formation of pus at the seat of disease and its appearance further down in the groin and thigh, is a common occurrence, although recovery sometimes takes place without the formation of pus. Sometimes the pus finds its way beneath the fascia of the psoas muscle, constituting *psoas abscess*. Sometimes the whole thigh becomes involved by the burrowing of the pus between and beneath the muscles. Sometimes the abscess points in the loins, when it is called *lumbar abscess*. When the disease is located in the cervical vertebræ the abscess points in the pharynx. When recovery takes place there is always anchylosis, caused by the union of the bony tissue of contiguous vertebræ. General constitutional measures form a large element in the treatment, those remedies which are adapted to the treatment of scrofula, consumption, and debility being especially appropriate. Attention to hygiene is of the greatest importance. The diet should be nutritious and easily digestible. As much exercise in the open air as is consistent with the condition of the patient, with bathing, rubbing, and general tonics. The mechanical surgical treatment consists in the application of apparatus calculated to sustain the form of the body, prevent attrition between the bones, and relieve irritation generally, the success of which depends upon the ingenuity and skill of the surgeon.

POTTSTOWN, a borough of Montgomery co., Penn., 35 m. from Philadelphia; on the Philadelphia and Reading railroad; pop. '70, 4,215. The town is amid picturesque scenery, and is the center of a fertile agricultural region. Coal and iron are found in great quantities in the neighborhood. The chief industries are connected with the rolling-mills, furnaces, the great Pottstown iron company, and the railroad repair shops.

POTTSVILLE, a city of Pennsylvania, on the Schuylkill river, at the entrance of Norwegian creek, 93 m. n.w. of Philadelphia, with which it is connected by railway. It is in the midst of a rich anthracite coal and iron region, and has several iron foundries, a brass foundry; manufactures of iron safes, sashes, and wood-work; county buildings; 10 banks; 3 English, 3 German, and 1 Welsh paper; and 19 churches, 3 of which are Welsh. Pop. '70, 12,384.

POT-WALLERS, or POT-WALLOPERS (from *pot*, and old English *wall*, to boil or bubble), the popular designation of a class of electors forming the constituency of various English boroughs—as Ilchester, Honiton, Tregoney, Old Sarum—before the reform act of 1832, whose qualification as housekeepers was considered to be established by their boiling a pot within the limits of the borough over a fireplace erected in the open air. The doing so was regarded as evidence that the elector was in circumstances to provide for his own subsistence, and not necessitated to apply for parochial relief.

POTY, a district t. and rising sea-port of Russia, in the Caucasian government of Kutais, stands at the mouth of the river Rion, on the eastern shore of the Black sea. The Rion connects the port with the interior, and since the establishment of regular steam communication by the Russian trade and navigation company in this quarter, the commerce and especially the transit-trade of this town has greatly increased. It is connected by railway with Tiflis. Pop. '67, 1309.

POUCH, MILITARY, a stout leather box, black or brown, lined with tin, covered with a strong flap, and ornamented with the device of the regiment, serves to carry the cartridges required by a soldier for immediate use. When cartridges are supplied for a whole day's service, two pouches are worn, one on the front point of the hip, and a larger one on a belt suspended over the left shoulder.

POUCHED RAT, *Pseudostoma*, a genus of *muridæ*, of which there are several species, natives of parts of North America w. of the Mississippi, and some of them very troublesome from the damages they commit in fields and gardens. They have four molars on each side in each jaw. The tail is short. The cheeks are furnished with pouches, to which the name refers, the openings of which are from the outside, and not from the mouth. The pouched rats burrow in the ground, and do great mischief to root-crops.

POUCHET, FELIX ARCHIMEDE, 1800–72; b. at Rouen; took his medical degree in Paris, and became in 1828 professor at the museum of natural history in Rouen, and director of that institution, and in 1838 professor at the medical school there. He invented an aëroscope and proposed a theory of spontaneous ovulation, often designated as Pouchet's laws. He published 80 volumes, the principal of which are *Théorie Positive De l'Ovulation Spontanée et de la Fécundation des Mammifères et de l'Espèce Humaine*, for which he received from the academy the prize of 10,000 francs; *Histoire des Sciences Naturelles au moyen âge; Heteorogénie; ou Traité de la Génération Spontanée; L' Univers les Infiniment Grands et les Infiniment Petits.* The last work has been translated into English.

"His works," says the *Nouvelle Biographie Générale*, "are distinguished for scrupulous accuracy. His experiments on spontaneous generation in opposition to those of M. Pasteur, had a great celebrity in the scientific world."

POUGHKEEPSIE, a city of New York, on the e. bank of the Hudson river, 75 m. n. of New York, finely situated on a table-land, about 200 ft. above the river. The city has broad and handsome streets, with fine public and private edifices. The collegiate school is situated on an eminence which rises 500 ft. above the river, and from which a magnificent prospect, embracing an area 2,500 sq.m. in extent may be obtained. Poughkeepsie contains a city-hall, academy, law-school, lyceum, orphan asylum, 6 public schools, an endowed female college, a rural cemetery, 6 banks, extensive iron-works; carriage, chair, and carpet factories; breweries, 21 churches, and has railway and steamboat communication with New York and Albany. Poughkeepsie was settled by the Dutch in 1690; during the revolution it was the state capital, and the convention met here, 1788, to ratify the constitution of the United States. Pop. in '70, 20,080.

POUGHKEEPSIE (*ante*), the co. seat of Dutchess co., on the Hudson river, and the Poughkeepsie and Eastern railroads; pop. '80, 20,207. It is regularly laid out; the streets are shaded and lighted with gas; and there are many handsome public and private buildings. Two m. n. of the city are the buildings of the Hudson river state hospital for the insane, built 1867–71 at a cost of about $750,000. Vassar college, for women, is about 2 m. e. of Poughkeepsie by horse-cars. The principal building, modeled after the Tuileries, is 500 ft. long, 5 stories high, and contains 242 bedrooms and 100 parlors, with recitation rooms, a chapel, library, laboratories, etc. The college has also an observatory, art museum, and gymnasium. The mineral cabinets are large. The art gallery has one of the best collections of water colors in America. The observatory has a large equatorial reflector. The college was founded in 1861 by Matthew Vassar, who endowed it with $400,000, and afterward made it large gifts. The number of students is about 400. Poughkeepsie is noted for the number of its educational institutions, among which, besides Vassar college, are the Poughkeepsie collegiate institute, the military institute, Cottage Hill seminary, St. Peter's academy, the Poughkeepsie female academy, Riverview military academy, and Eastman's national business college. It is connected with New Paltz, opposite, by steam ferry. The city has a considerable trade with the rest of the county. The manufacturing industries are large, including rolling-mills, furnaces, ship-yards, tanneries, foundries, coopers' shops, boot and shoe factories, etc. It has been for some time in contemplation to put a bridge across the Hudson at this point, at an estimated cost of $2,600,000. Over this it is proposed to run a railroad connecting Boston with the Erie railroad and the west.—The state legislature met here during the invasion, 1777–78, and assented to the articles of confederation.

POUILLET, Claude Servais Mathias, 1791–1868; a French physician; educated in Paris; became professor in 1827, director in the conservatory of arts and trades in 1832; in 1838 professor of physic at Sorbonne, and as a lecturer distinguished by the elegance of his diction and his power to make scientific studies interesting and instructive to unscientific people. He was the inventor of instruments for measuring the varying compressibility of gases; the originator of a theory of the sun's heat, and of an instrument by which it is measured, called the *pyrhéliometer;* and of experimental demonstrations of the laws of electric currents. His principal work has been abridged for the use of schools under the title of *Notions Générales de Physique et de Météorologie à l'utage de la jeunesse.* His works are numerous, and embrace memoirs on the voltaic pile, the source of thermo and hydro-electricity, the elasticity of fluids, the latent heat of vapors, measures of extreme heat and cold, the height, speed, and direction of clouds, and the use of photography in determining them.

POUJOULAT, Jean Joseph François, 1808–80; b. France; co-laborer with the elder Michaud upon the *Bibliothèque des Croisades*, and traveler with him through European and Asiatic Turkey in the study of the scenes of the crusades. On their return they published in 1832–35 the *Correspondence d'Orient*. An ardent royalist, and bitterly opposed to the irregular advent of Louis Philippe to the throne in 1830, he made himself felt in politics through contributions to the *Quotidienne*. Having cultivated the fear of republics among the middle-classes of France, he helped prepare the ground for the *coup d'état* of Napoleon in 1851; but made as determined war upon the new government as upon that of Louis Philippe, through the columns of the *Union*, the *Revue des Deux Mondes*, and other journals. His *Histoire de Jérusalem*, a religious and philosophical picture, was crowned by the academy in 1840–42; also *Histoire de St. Augustin*, 1844. In 1863 he published a review of Rénan's *Life of Jesus*. He has been a prolific author of works mostly on religious history and its current discussions.

POULPE, *Octopus*, a genus of *cephalopoda* (q.v.) of the order *dibranchiata;* having eight *feet* or *arms*, nearly equal, united at the base by a membrane, and very long in proportion to the body. There is no shell, but it is represented by two small grains of horny substance imbedded in the back, one on each side. The arms are used for swimming in water, creeping on land, and seizing prey. Poulpes swim by contractions of the muscular web of the body, which extends upon the arms. They creep on shore in a spider-like manner, with sprawling arms. Like other cephalopods, when alarmed or annoyed, they discharge an inky fluid. One species (*O. vulgaris*) is occasionally found on the British shores, and is more common on the southern shores of Europe, and elsewhere in the Mediterranean. It is the *polypus* of the ancients. Its arms are six times as long as its body, and each furnished with 120 pairs of suckers. See CEPHALOPODA. In warmer seas very large species occur; and although the stories related of their laying hold of and swamping boats, seizing and killing swimmers, etc., may probably be fabulous, yet it is certain that some of them have arms at least 2 ft. long, and there is probable reason to suppose that much larger species exist, which must be powerful and dangerous creatures. A poulpe, with its eyes fixed on its adversary, and its beak threatening to approach, must have a sufficiently formidable aspect. It was no doubt a poulpe which Mr. Beale encountered on the shore of the Bonin islands, which he attempted to intercept in its retreat toward the sea, and which turned and fastened upon him, laying hold of him with its arms, and trying to bite him with its parrot-like beak.—See *The Octopus*, by Henry Lee (1875).

POULSON, ZACHARIAH, 1761–1844; b. Philadelphia; edited and published *The American Daily Advertiser*, 1800–39, the first daily in the country. He was state printer for some years, and the publisher of *Poulson's Town and Country Almanac*, 1789–1801. He also published Proud's *History of Pennsylvania*, 1797–98. He was a member of several literary and charitable associations, and connected with the library company of Philadelphia for 58 years.

POULTICE. See CATAPLASM.

POULTRY (Fr. *poule*, a hen), a collective name for useful domesticated birds. It is sometimes limited to the domesticated gallinaceous birds, but ordinary use includes all the birds reared for economical purposes. These belong exclusively to two orders of birds, the *gallinaceous* and *palmiped;* the common fowl, pea-fowl, Guinea-fowl, turkey, guan, and pigeon belonging to the former; and the different kinds of duck and goose, as well as the swan, to the latter. For what relates to the different species and their varieties, we refer to these heads; devoting this article to some general remarks as to the management of poultry.

In general, the rearing of poultry is regarded as a very subordinate branch of rural economy, and it is pursued chiefly where agriculture is in a somewhat primitive state, the skillful and enterprising farmer deeming it beneath his attention, or finding that he has not time to attend to it, and often looking on the feathered inmates of his farm-yard almost as a nuisance because of their invasions of his fields. It may pretty safely be asserted that there is no good reason for this, and that poultry properly cared for would always be found a source of profit. The farm-yard affords great advantages for the keeping of poultry, and the increasing demand of the market promises a sure return. In some parts of Britain and in Ireland, where the farms are small, poultry are very extensively kept by farmers and cottagers; but the n. of France and Pomerania exceed all other parts of Europe in poultry-keeping, which there is not unfrequently the leading object of husbandry, and the traffic in the products of the poultry-yard is on a truly great scale.

There is very commonly no building erected for the special accommodation of poultry; but perches and places for nests are provided for them in a cow-house or some other farm-building; or, in very many cases, when kept by cottagers, they roost on joists of the roof, within the door of the cottage itself. In such cases, they roam at liberty during the whole day, and find much of their food in the fields and on the road sides, although the feeding of them with corn and other food is not neglected by the careful housewife. But it is often undesirable, for the sake of fields or gardens, that so much liberty should be allowed to poultry, and they may be very advantageously kept either wholly or mostly in confinement. If circumstances permit, it is good for them to be let out for an hour or two daily into a grass field, but it is not necessary if they are provided with a warm, clean, and well-ventilated house, to which a spacious open court is attached, and are regularly supplied with abundance of food, water, sand, or fine ashes, lime, and small stones, all requisites to their healthful existence. The food must also be of various kinds. Poultry must have supplies of grain or pulse, and of soft food made of the meal of grain or pulse: the kind may depend upon convenience and cheapness; and instead of such food, boiled potatoes may to some extent be used. *Bran* is a very good article of food for poultry. But the same food, without variation, should not be given for any considerable time. And it is indispensable that all kinds of poultry be frequently, if not even daily, supplied with green food, as blades of kale, cabbage, cauliflower, turnips, etc., or lettuces, cresses, chickweed, sow thistle, etc. It is pretty safe to observe the kinds which they like, and to allow them to choose for themselves. When they have no opportunity of seeking worms, snails, slugs, and insects for themselves, animal food must be given, and the refuse of the kitchen cannot be more profitably employed. It is possible at some seasons to give too much food, making the poultry too fat, and diminishing the production of eggs; but at other times, as during the season of molting, food cannot be given too plentifully. Water must at all times be abundantly supplied.

Poultry-houses may be built of any material that is most convenient; but warmth cannot be too much regarded. A poultry-house of 4 ft. square should have a yard at least 8 ft. by 4. The yard is inclosed by wire-netting. The floor of the house, made of clay or other material, ought to be so firm and hard as to admit of its being easily swept, and this should be often done. The house is provided with roosting places on the ground or above it, according to the kind of poultry, and with nests for laying in. Hatching ought to be conducted in a separate place. The court should be furnished with a "lean-to" shed on one side, under which the birds may find shelter from sun or rain, and here they should find sand or fine ashes to fling over themselves, according to their manner, to rid themselves of insect tormentors. Lime is also necessary for them, large quantities of it being used to make egg-shells, besides what the animal system otherwise requires. It may be very conveniently supplied in the form of lime rubbish from old walls, in which also occur in abundance such small stones as birds need in order to the trituration of the food in their gizzard.

In the places appropriated to hatching, it is good to have a fresh turf deposited, to prevent the eggs from becoming too dry, and it is even recommended that the eggs should be slightly moistened every day. It is said that the inner membrane of the egg is otherwise apt to become hard, so that the young chick cannot break through it.

Where purity of breed is of importance, as when fowls are to be exhibited in prize competitions, great care must be taken to keep the different kinds perfectly separate; otherwise, intermixture to a certain extent is not undesirable. It is always, indeed, to be desired that each good kind be kept pure and in as great perfection as possible, for improvement of the stock. But even in a small poultry-house, it is desirable to have different kinds, some being particularly estimable for their flesh, some for the abundance and quality of their eggs, some for their disposition to incubate, etc. For web-footed birds, free access to water is required; but some of the kinds are well enough provided for by a pretty capacious trough.

Among the diseases of poultry, *gapes* (q.v.) is one which very frequently demands attention, particularly in young chickens. *Pip* or *roup* is another. Some of the maladies which cut off great numbers of young chickens, and still more of turkey-poults, may be in a great measure prevented by supplying abundance of nourishing and sufficiently varied food, with water and lime; and by preventing the young birds, particularly turkeys, from getting among wet grass.

It is sometimes taken for granted by writers on this subject, that all the birds which can be domesticated with advantage, have already been domesticated. The assumption is quite gratuitous, and it might as well be asserted that improvement has reached its utmost in any other direction. The concurrent supposition that the common domesticated kinds were given to man at first as domestic, is likewise unsupported by evidence, although the domestication of some of our poultry birds must be referred to a very early date. Among the *anatidæ*, some progress has recently been made in the domestication of new kinds; and a beginning may even be said to have been made as to some additional gallinaceous birds.

Much valuable information on the management of poultry will be found in the *Hen-Wife, Her own Experience in Her own Poultry-Yard*, by Mrs. Fergusson Blair of Balthayock (Edin. 2d ed. 1861).

POUNCE, powdered resin, or some gum resin such as mastic, sandarach, or copal, and also the powder of cuttle-fish bones. It is used for sprinkling over freshly written writing, to prevent blotting; fine sand is often substituted for pounce. Blotting-paper has almost superseded the use of pounce in Great Britain.

POUND, in English law, means an inclosure, of which there was generally one in every parish, or at least every manor, in which stray cattle were put and detained until the damage done by them was paid for. Whenever a stranger's or neighbor's cattle trespass on another's lands, the latter can seize them, and take them to the pound, or impound them, as it is called, *damage feasant*, and can keep them there till the expenses are repaid. There was a distinction between pound overt, or common pound, and pound covert, or close pound; in the former case, the owner of the beasts could go and feed and water his cattle while impounded, and it was his duty to do so; but not in the latter case. Now, it is compulsory for the impounder, in all cases, to supply the cattle with food, otherwise he incurs a penalty; and if impounded cattle are not sufficiently fed, a stranger who feeds them may not only trespass on lands to do so, but can recover the costs from the owner of the beasts. This was formerly an important head of law, and it is not obsolete, for the power to impound stray cattle still exists, though common pounds are disappearing, for, in point of law, they are not necessary, since the impounder can put the cattle in his own stable or field.

POUND (Sax. *pund*, Ger. *pfund*, Lat. *pondus*, "weight"), the unit of weight in the western and central states of Europe, differing, however, in value in all of them. The symbol (*lb.*) for it is equally general, and is derived from the Latin word *libra*. The old English pound, which is said to have been the standard of weight from the time of William the conqueror till that of Henry VII., was derived from the weight of 7,680 grains of wheat, all taken from the middle of the ear, and well dried. After this time, the *troy* pound, which was heavier by $\frac{1}{15}$ than the old English pound, became the standard, but it was divided into only 5,760 grains. Henry VIII. introduced the *avoir-*

dupois pound for weighing butcher meat in the market, and it gradually came to be used for all coarse goods in frequent demand; it contained 7,000 troy grains. The troy and avoirdupois pounds, both legal measures, continued in regular use from this period—the former being gradually appropriated by jewelers and apothecaries; and, to prevent variation, a brass weight of one pound troy was constructed in 1758, and placed in charge of the clerk of the house of commons. This weight, in 1824, was declared by act of parliament to be "the original and genuine standard measure of weight," and that from which the value of the ounce, grain, pound avoirdupois, etc., were to be deduced, but being, along with the standards of measure, destroyed in 1834, a commission was appointed to consider the best means of replacing them. After long deliberation, hearing of evidence, and sifting of suggestions, it was agreed, *inter alia*, that the standard of weight should be a piece of platinum, weighing 7,000 grains (an avoirdupois pound), but that this piece should not be defined with reference to any natural standard. The troy pound thus ceased to be the standard, but its use was allowed to jewelers and (differently divided and subdivided) to apothecaries.

The pound-weight of silver, a common money standard among the ancient Romans, was introduced by them into the countries they conquered, and thus the term "pound" became a designation of a certain amount of coined money. Thus, nowadays, the English pound is considered as something (a coin or otherwise) equivalent to 20 shillings, but originally it denoted the pound of silver which was coined into 20 shillings. From Edward II.'s time, the coins were more and more diminished in size, that monarch coining 25 shillings from a pound of silver; while from the same weight of bullion his various successors coined 30, 45, 48, 96, 144, 288, in the time of Elizabeth 60, and (during the reigns of her successors) 62 shillings. George I. coined 66 shillings to the pound of silver, and this rate still continues, the term "pound" having been completely severed from its original meaning, and appropriated to signify 20 shillings of the present coinage.

POUNDER, the term used in describing the force of a cannon employed in firing solid shot, as a "9-pounder field gun," a "300-pounder Armstrong," etc. See CALIBER.

POUSSIN, GASPAR, a celebrated landscape painter, was the son of a Frenchman, settled in Rome, and was born there in 1613. He was the pupil of Nicolas Poussin, who had married his sister, and from respect to that great artist, adopted his name in place of his own, which was Dughet. He was called by the Italians Gasparo Duche, and he inscribed his etchings, eight in number, in that way. His landscapes are composed in general from studies in the Campagna of Rome and surrounding country, worked out with the feeling of a mind deeply imbued with classical associations, and tending toward melancholy reflection, by contrasting the glory of the past with the decadence of the present—ideas entirely the opposite of these of Claude, who, trusting to the never-fading beauty of nature, endeavored, from the scenery and architectural remains it Italy, to realize the classic age in all its glory. The national gallery possesses six specimens of Poussin, some of them being reckoned masterpieces, as the "Sacrifice of Isaac," a "Land Storm," and an "Italian Landscape, with a View of a Town." Poussin died in Rome, 1675.

POUSSIN, NICOLAS, a painter of great celebrity, born near Le Grand-Andely, in Normandy, in 1593 or 1594, was first a pupil of Quintin Varin, then painting pictures for the church of Grand-Andely; but at the age of 18 went to Paris, studied under Ferdinand Elle, the Fleming, Lallemand, and others; but chiefly improved himself by drawing from casts, and drawings and prints after Raphael and Julio Romano, in the collection of M. Courtois, who accorded him access to them. After a long and hard struggle, he attained the object of his desire—namely, the means of visiting Rome. He was 30 years of age when he arrived there, and a considerable period elapsed after that before he obtained much employment. At length, however, he received several important commissions from the cardinal Barberini, which he executed so successfully that he afterward rapidly acquired fame and fortune. After an absence of 16 years, he returned to Paris with M. de Chantelou, and was introduced by cardinal Richelieu to Louis XIII., who appointed him his painter in ordinary, with apartments in the Tuileries, and a salary of £120 a year. Poussin returned to Rome for the purpose of giving up his establishment there, and taking his wife to Paris; but while he was occupied with these arrangements, Louis XIII. having died, he gave up all thoughts of returning to his native country, remained in Rome, and after a very successful career, died in 1665. His reputation mainly rests on his success in aiming at the classic style. Sir Joshua Reynolds says, "No works of any modern have so much the air of antique painting as those of Poussin." Many prefer his landscapes, or those pictures of his in which landscape predominates, to his compositions in which his attention has been bestowed chiefly on the figures. Upward of 200 prints have been engraved from his works. The national gallery has several of Poussin's pictures, two of which are particularly praised, "A Bacchanalian Dance," and "A Bacchanalian Festival."

POWAN, *Coregonus* (q.v.) *cepedei*, a fish found in loch Lomond, Scotland, and often called *fresh-water herring*. It is not found in any other British lake or river, and has not yet been identified with any fish of the continent of Europe, although probably it is to be found in some of the Scandinavian lakes. It resembles the pollan (q.v.) of the Irish lakes, but is readily distinguished. The powan sometimes attains the length of 16 inches. Great shoals are seen in loch Lomond, rippling the surface of the water, and approaching the shores in the mornings and evenings. They are never seen in the middle of the day. The powan is highly esteemed for the table, and is in best condition in August and September. It is generally caught by nets.

POWDERED, or SEMÉE, in heraldry, strewn with an indefinite number of small charges.

POWELL, a co. in e. central Kentucky; drained by the Red river and many creeks; about 200 sq.m.; pop. '80, 3,639—3,631 of American birth; 288 colored. The surface is hilly and uneven; corn, grass, and pork are the staples. Co. seat, Stanton.

POWELL, The Rev. BADEN, an eminent English savant, son of a London merchant, was born at Stamford hill, near London, Aug. 22, 1796, and studied at Oriel college, Oxford, where he graduated M.A., with first-class mathematical honors, in 1817. Powell took holy orders in 1820, and was appointed vicar at Plumstead, in Kent, in 1821. In 1824 he was elected a fellow of the royal society; and three years later, was appointed Savilian professor of geometry, a chair which he held till his death, which took place in London, June 11, 1860. As a professor, his great aim was to bring about a larger recognition of the importance of physical and mathematical science in the curriculum of learned study at Oxford, and his efforts have not been altogether in vain. To the *Philosophical Transactions*, the *Reports* of the British association and other vehicles of scientific instruction, he contributed numerous valuable papers; but is perhaps best known by his strenuous exertions to obtain for modern science the right of modifying the views of nature and the origin of the world, expounded or thought to be expounded in the Jewish Scriptures. In this perilous department of controversy Powell displayed great learning, logical power, moderation of tone, and philosophic urbanity; but his conclusions were too unmistakably rationalistic to be palatable to the orthodox. Among his works may be mentioned *A Short Elementary Treatise on Experimental and Mathematical Optics, Designed for the Use of Students* (Oxford, 1833); *Revelation and Science* (Oxford, 1833); *A Historical View of the Progress of the Physical and Mathematical Sciences* (Lond. 1834); *The Connection of Natural and Divine Truth* (Lond. 1838); *Tradition Unveiled: A Candid Inquiry into the Tendency of the Doctrines advocated in the Oxford Tracts; A General and Elementary View of the Undulatory Theory as applied to the Dispersion of Light*, etc. (Lond. 1841); *Essays on the Spirit of the Inductive Philosophy*, etc. (Lond. 1855); *Christianity without Judaism* (1857); *The Order of Nature considered with Reference to the Claims of Revelation* (1859); and *On the Study and Evidences of Christianity* in *Essays and Reviews* (1860).

POWELL, CHARLES STUART, 1749–1811; b. England; played with the Covent Garden company, London, and was manager of the Haymarket theater. His first appearance in the United States was at Boston in 1792, and he managed the Boston theater, 1794–96. He afterward managed a theater in Halifax, where he died.

POWELL, JOHN HARE, 1786–1856; b. Philadelphia; educated at Philadelphia college; went into business and acquired wealth. He was secretary of the American legation in London 1807–11, and inspector-gen. in the Pennsylvania militia 1814–15. He now devoted himself to agriculture; did much to improve the breeds of cattle in the United States, and founded the Pennsylvania agricultural society in 1823. He published *Hints for American Farmers*, and *Memoirs of the Pennsylvania Agricultural Society*.

POWELL, JOHN WESLEY, b. New York, 1834. His family removed to Wisconsin in 1842, where, after receiving a common-school education, he became a teacher; entered Oberlin college, Ohio, which at the end of two years he left to study natural history. He traveled four summers in the western states collecting specimens. In 1860 he entered the army as a volunteer, and at the battle of Shiloh lost his right arm. Subsequently he became maj. of artillery and was engaged at Vicksburg and Atlanta. In 1865 he became professor of geology in the Wesleyan university at Bloomington, Ill. In 1867–68. having been authorized by congress to make a scientific exploration of Colorado territory, he surveyed with a party the valley of the Colorado river through its entire length, enduring great hardships. Important discoveries by this extraordinary expedition have been made in geology, archæology, and ethnology.

POWER, in point of law, means an authority given to some person who would otherwise not be entitled to do the specific thing empowered. Thus an authority given to an agent to act for another is called a power of attorney; and there are numerous examples of powers contained in marriage settlements, wills, and miscellaneous deeds, which authorize one of the parties to do something in certain contingencies. Thus a power of revocation is often reserved to a party to revoke a will or deed. There is a power of appointment given to a married woman or widow to bequeath or divide certain property in certain events among her children. So a power to charge or jointure an estate, and to secure the portions of children. There are many nice and difficult rules of law applicable to matters connected with and arising out of powers. A power is created by a deed or will; and it is said to be executed when it is carried out. In Scotland powers are generally called faculties (q.v.).

POWER (*ante*), in law, may be considered under two heads—powers of attorney and powers created by will or deed, the latter class being connected with the law of real estate. 1. A power of attorney may be general, authorizing the agent to act for the grantor generally; or special, limiting his authority to particular acts. It is strictly construed, and may or may not be under seal, according to the statutes of the states. It was formerly held that the attorney could not execute a conveyance under seal unless his own authority was sealed, but this doctrine has been generally abandoned in this country. Powers of attorney are revocable or irrevocable; revocable in cases where they are not "coupled with an interest," and irrevocable only in that case. The power, if revocable, expires at the death of the grantor. 2. In the law of real property the term power was used to indicate an authority enabling a person to dispose of interest in real property through the statute of uses (see *ante*). The creation of such a power may be by will or deed, and the grant may contain a reservation to the grantor. Such powers may be *collateral*, where the donee has no estate in the realty; *general* or *special*, according to the liberty given the donee to appoint whom he pleases, or the confining of his choice to particular individuals or a class; may be of *appointment*, to create new estates, or of *revocation*, divesting or abridging an already existing estate; *appendant*, where a legal estate, as a life estate, is given the donee, and the powers granted by him must be limited by, and depend for their validity upon, his own estate, as leases under the life estate; or *in gross*, where the donee has authority to create only estates which do not depend on or take effect from his own estate or interest. The right of the donee to create an estate by the power is not itself an estate. The execution of the power must be by the donee, and cannot be assigned unless coupled with an interest or expressly authorized by the grant. If the donee alone be interested in the performance he may execute or not as he pleases, but equity will compel execution where the power is coupled with a trust for others. Where the execution in the exact terms of the power is impossible, courts may apply the *cy près* doctrine and carry out the donor's intention as closely as possible. The doctrine of powers is of less importance in the United States than in England, and is there chiefly used in perpetuating great family estates. By its means the head of a family may, in some measure, provide for contingencies impossible to foresee.

POWER, of a quantity, in mathematics, the result derived from multiplying it a certain number of times by itself. Thus the 2d power of 3 is $3\times3=9$, the 3d power is $3\times3\times3=27$, etc. The number of times the quantity is to be multiplied by itself, or the degree of the power, is denoted by the exponent, written at the right of the quantity; thus 3^2 denotes the 2d power of 3, and 3 is called the root of 3^2.

POWER, TYRONE, 1795–1841; b. Ireland; taken to Wales while a child, and there made his first appearance on the stage as *Romeo*. In 1818 he retired, but in 1821 resumed his profession, and in 1824 made his first great success in London in the part of *Paddy O'Halloran*. He introduced the portrayal of Irish character in modern comedy, and was very successful in his visits to this country, 1833 and 1841. He was lost at sea on the return voyage of the last trip. He wrote *Impressions of America*, 1835, and two novels of no great merit.

POWERS, HIRAM, American sculptor, son of a farmer, and the eighth of nine children, was b. at Woodstock, Vt., July 29, 1805, and acquired the rudiments of education at a free district-school. While still a boy he went to Cincinnati, Ohio, where he became an apprentice to a clock-maker, and about the same time formed the acquaintance of a German sculptor, who taught him to model in plaster. Subsequently, he was employed for several years making wax-figures and fitting them with machinery, for the Cincinnati museum, where his "Infernal Regions" horrified thousands of visitors. In 1835 he went to Washington, where he executed the busts of several distinguished persons; and, with the aid of Mr. Nicholas Longworth, in 1837 went to Italy to study his art, residing in Florence till his death. In 1838 he produced his statue of "Eve," which excited the admiration of Thorwaldsen; and in 1839 the still more popular "Greek Slave," of which six copies in marble, with cast copies innumerable, were produced. Of his "Fisher Boy," three copies were ordered. Among his other works the chief were "Proserpine," "Il Penseroso," "California," "America" (the last for the Crystal Palace, Sydenham); statues of Washington for the state of Louisiana, of Calhoun for South Carolina, and Webster for Boston; and busts of Adams, Jackson, Marshall, Van Buren, and other distinguished Americans. He died June 27, 1873.

POWERS, MECHANICAL. See MECHANICAL POWERS, *ante*.

POW'ESHIEK, a co. in s.e. Iowa, drained by English and North Skunk rivers and Bear creek, traversed by the Central Iowa, and the Chicago, Rock Island and Pacific railroads; about 575 sq.m.; pop. '80, 18,936—17,015 of American birth. The surface is rolling, and contains coal. The soil is fertile. The principal productions are corn, oats, wheat, wool, and hay. Co. seat, Montezuma.

POWHATAN', a co. in s. central Virginia, bounded by the James river on the n. and the Appomattox on the s.; 280 sq.m.; pop. '80, 7,817—7,773 of American birth; 5,091 colored. The surface is level and heavily wooded; corn, tobacco, and pork are the staples. The Richmond and Danville railroad touches the county. Co. seat, Scottsville.

POWHATAN', 1550–1618; an American Indian sachem. His name was Wahunsonacock, the name Powhatan being that of his residence, and given to him erroneously by the English. His residence consisted of 12 wigwams near the site of Richmond. He raised himself from the rank of a chieftain to the command of more than 20 tribes, num-

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bering about 8,000 people. His territory extended from the most southern tributaries of the James river, on the s., to the Patuxent on the north. When first known to the English he was about 60 years of age, of a grave aspect, tall, and well-proportioned, and very vigorous. Most of the tribes over whom he ruled he had conquered. He usually kept a guard of 40 or 50 warriors around him, especially when he slept, but increased the number to 200 after the English came. At first he practiced much deception toward the English, and his plans for their destruction showed great cunning; but being baffled by the superior sagacity of capt. Smith, he concluded to live at peace with the new-comers, and received Smith and Newport hospitably. When afterward Smith was taken prisoner, and about to be killed, he spared his life through the entreaties of his young daughter Pocahontas, and sent him to Jamestown with professions of great regard. Newport, returning from England, brought presents, one of which was a crown, and after a few days the ceremony of coronation was performed. Powhatan for this honor gave him his mantle and old shoes. Pocahontas having by a stratagem been made a prisoner by the English and taken to Jamestown, a message was sent to Powhatan that he must ransom her with certain men and articles, which he was accused of having taken. He made no answer for three months. Meanwhile an English youth Rolfe wooed her, and obtained her consent to marriage. The connection proved a bond of union between Powhatan and the English. The grandson of Powhatan, Thomas Rolfe, was educated in London, came to America, became a gentleman of distinction, and possessed an ample fortune. He was the ancestor of the distinguished John Randolph, and of others bearing that name in Virginia.

POW'NALL, THOMAS, 1722–1805; b. Lincoln, Eng.; took a degree at Cambridge, 1743; occupied several political positions, and in 1753 was sent out as secretary to the province of New Jersey, of which he became lieut.gov. in 1755. He was gov. of Massachusetts from 1757 to 1760, and of South Carolina in 1761. On his return to England he became a member of parliament, and opposed the overbearing course of the crown toward the American colonies. He was somewhat distinguished as an archæologist. Among his publications were, *A Topographical Description of the Middle British Colonies*, 1775, and *The Administration of the Colonies*, 1766.

POYDRAS, JULIEN; d. 1824; b. Louisiana; founder of an orphan asylum for girls, to which he gave $100,000; and of a college at Point Coupée, which he endowed with $20,000. He was delegate from the territory of Orleans, now the state of Louisiana, in 1809–12.

POYN'TELL, pavement or tiles laid in small lozenge form.

POZZO DI BORGO, CARLO ANDREA, a celebrated Russian diplomatist, was b. at Alala in Corsica, March 8, 1768, and was educated at the university of Pisa. Returning to Corsica, he adopted the profession of advocate, in which he soon became distinguished for his acuteness, ingenuity, and brilliant eloquence; and about this time an intimacy sprang up between him and the two young Bonapartes, Napoleon (I.) and Joseph. Pozzo's great ability soon gained for him the esteem of Paoli (q.v.), who made him the confidant of his plans, to the intense disgust of the Bonaparte family, who considered themselves slighted. A coolness in consequence sprang up between Pozzo and young Napoleon, which, as their paths in life diverged more and more, passed through the various grades of antagonism, dislike, distrust, and hatred, till, when the latter swayed the scepter of France, and the former became the supreme trusted adviser of Russia and Austria, it culminated in a deadly struggle for victory between the diplomatist and the warrior, to be ended only by the death of one or the destruction of his power. Pozzo represented Corsica in the French national assembly (1791–92); but his party, that which wished to unite liberty and hereditary rule, being overpowered by their "radical" opponents, he was compelled to return to Corsica, where he again attached himself to Paoli's party; and on the failure of that chief's plans, retired to London. Here he became the agent of the French refugees; and in 1798, having now thoroughly broken with the Bonapartes, he went to Vienna to promote an alliance of Austria and Russia against France, and accompanied the Russian army in the subsequent campaign of 1799. In 1803 he entered the Russian service as a councilor of state, from this time devoting his whole attention to diplomacy. He was at the bottom of the Russo-Austrian alliance, which was dissolved by the battle of Austerlitz (1805); but after the treaty of Tilsit, fearing lest Napoleon might insist upon his surrender, he retired to Austria, from which country Napoleon, in 1809, demanded his extradition. The emperor Francis refused; but Pozzo, to save trouble, retired to England (1810), where he stayed for some time, and then returned to Russia. He soon after induced the emperor Alexander to make certain custom-house regulations which offended Napoleon, and were a chief cause of the rupture which resulted in the campaign of 1812; he also suggested to the emperor, and effected the seduction of Murat, Bernadotte, and Moreau from the Napoleonic cause; and after the victorious allies had driven Napoleon across the Rhine, Pozzo, at the congress of Frankfort-on-the-Main, drew up his famous declaration, "that the allies made war not on France, but on Napoleon." From this time his whole energies were devoted to the task of keeping Alexander inflexible with regard to Napoleon's seductive offers of accommodation; but after his old antagonist's downfall, he exerted himself with equal vigor at Paris (where he signed the treaty of 1815 as Russian ambassador) and Aix-la-Chapelle

(1818) to ameliorate, as much as possible, the hard conditions imposed upon France. After the accession of the emperor Nicholas, he was, though highly esteemed, less confided in, and accordingly accepted the post of Russian ambassador in London; but retired from public life in 1839, and settled in Paris, where he died Feb. 15, 1842.

POZZOLA'NA, or PUZZOLANA a mineral substance, produced by volcanoes, and abundant in volcanic countries, is named from Pozzuoli, near Naples. It is earthy in character, consisting of particles in a very loose state of aggregation, but its chemical composition agrees with that of basalt (q.v.). It is found of various colors—brown, yellow, reddish, and gray. Brown and yellow are the ordinary colors of the pozzolana of Italy. See CEMENTS.

POZZUOLI, a city of southern Italy, at the e. of the bay of Naples, in the province of Naples, with 11,752 inhabitants; has manufactures of soap. But the interest which attaches to it is drawn from its numerous memorials of classic ages. Its cathedral was the temple of Augustus. There is the temple of Serapis, an Egyptian god, who was invoked by the priests to render the mineral waters of the place efficacious as remedies. The interior of the temple had a portico of 24 pillars, surrounded by 70 chambers for the sick and for the priests. In the harbor there may still be seen 13 pillars, which formerly supported as many arcades, under which the inhabitants used to congregate to watch for the vessels coming from Africa. There is an arch erected to Antoninus Pius, for having restored 20 of those pillars. There are the remains of an amphitheater which might have contained 25,000 spectators. The Solfatara (*Forum Vulcani*) is a half-extinct volcano near Pozzuoli, from which springs saline water, used as a remedy for cutaneous diseases. Near the Montenuovo there is the famous lago d'Averno, inclosed among hills; and at a short distance from it there is the Sibyl's cave (*La grotta della Sibilla*), which, however, is nothing more than the remains of a subterranean passage leading, perhaps, to Baja. On a plain there is an extinct volcano; there Cumæ once stood, now all in ruins. In the environs of Pozzuoli are to be seen the promontory of Posilipo, the Elysian fields (*Campi Elisi*) near the harbor of Miseno, and the lake of Agnano, formerly the crater of a volcano.

Pozzuoli was probably built by the Cumani (Greek colonists of Cumæ), who gave to its gulf the name of *Cumanus*. They called the new port *De Cœarchia*, a name which was afterward changed to *Puteoli*, in allusion perhaps to the sulphur wells or springs (*putei*) with which it abounded. Puteoli is first mentioned in history during the second Punic war, when, by order of the senate, it was surrounded by strong walls. In 214 B.C. it repulsed Hannibal, and from this period rose in importance until, toward the close of the republic, it became virtually the port of Rome, and during the empire was really the first emporium of commerce in Italy. Puteoli was destroyed by Alaric, Genseric, and Totila, and though rebuilt by the Byzantine Greeks, it was exposed to new devastations, to earthquakes, and volcanic eruptions, and soon sank into the decay which continues to mark it.

PRACTICE, in arithmetic, is the name given to a method, or rather a system of expedients, for shortening or avoiding the operation of compound multiplication. The nature of the expedients will be best understood by an example: Suppose that the price of 64,875 articles at £2, 17s. 6d. is required. It is obvious that the price, at £1, would be, £64,875; therefore, at £2, it is £129,750; at 10s., it is the half of that at £1, viz., £32,437, 10s.; at 5s., the half of this last sum, or £16,218, 15s.; and at 2s. 6d., the half of this, or £8,109, 7s. 6d. The sum of these partial prices gives the whole price—thus:

	£	s.	d.		£	s.	d.
Price at	2	0	0		129,750	0	0
" "	0	10	0	(=½ of £1),	32,437	10	0
" "	0	5	0	(=½ of 10s.),	16,218	15	0
" "	0	2	6	(=½ of 5s.),	8,109	7	6
" "	2	17	6		186,515	12	6

The general principle of the method is to decompose the lower denominations of the compound factor into *aliquot parts* of the higher unit. A still simpler way with the above example is the following:

	£	s.	d.		£	s.	d.
Price at	3	0	0		194,625	0	0
" "	0	2	6	(=⅛ of £1),	8,109	7	6
" "	2	17	6		186,515	12	6

PRADIER, JEAN JACQUES, 1792–1852; b. Switzerland; studied sculpture in the studio of Lemot at Paris. In 1813 his group of "Philoctetes at Lemnos" won the great prize, and the privilege of residing as an academy student in Rome, where he remained five years. There he studied the antique, but the works of Canova seem to have had a greater influence over him. Upon his return to Paris, in 1819, he entered upon a career of great popularity. Among his more famous works are "Bacchante and Centaur," 1819; "Psyche," 1824; "Venus and Love," 1836; "Phryne," 1845, "Pandora," Bacchantes, Amazons, etc. He also produced many religious pieces, such as a colossal "Christ on the Cross," a "Marriage of the Virgin," for the Madaleine, a "Virgin" for the Avignon cathedral, etc.

PRADT, Dominique Dufour, Abbé de, 1759–1837; b. France; represented the clergy of Normandy in the states-general. He acted with the royalists in the constituent assembly, was in exile at Hamburg, 1791–1801, and was created baron, bishop of Poictiers, and grand almoner to the emperor Napoleon in 1804. For his efforts in securing the abdication of Charles IV. of Spain he was made archbishop of Mechlin, and in 1812 minister at Warsaw; but he soon fell into disgrace with the emperor, who sent him back to his diocese. When the allies invaded France, he joined the Bourbons, but failed to secure their favor, and had to give up his archbishopric, in which he had never been confirmed by the pope.

PRAED, Winthrop Mackworth, 1802–1839; b. London; educated at Eton and Trinity college, Cambridge, graduating at the latter in 1825, distinguishing himself by his classical attainments, and receiving numerous prizes; admitted to the bar in 1829; in 1830 and 1831 was a member of parliament; in 1834 secretary of the board of war; subsequently recorder of Barnstaple and deputy high-steward for the university of Cambridge; opposed the reform bill. A complete edition of his poetical works, prepared by his sister, lady Young, with a memoir by the rev. Derwent Coleridge, was published in 2 vols. His *Poems* were edited by R. W. Griswold in New York.

PRÆMUNIRE, the name given, in English law, to a species of offense of the nature of a contempt against the sovereign and his government, and punishable with forfeiture and imprisonment. The name is derived from the first words (*præmunire* or *præmonere facias*) of a writ originally introduced for the purpose of repressing papal encroachments on the power of the crown. The first statute of præmunire was passed in the reign of Edward I. The attacks of the popes on the rights of private patrons, by bestowing bishoprics, abbacies, etc., on favorites before they were void, were the immediate cause of various subsequent statutes of præmunire, which made it penal to endeavor to enforce the authority of papal bulls and provisions in England. By later statutes, a number of offenses of a miscellaneous description have been rendered liable to the penalties of a præmunire, as (by 6 Anne, c. 7) the asserting by preaching, teaching, or advisedly speaking, that any person, other than according to the acts of settlement and union, has any right to the throne of these kingdoms, or that the sovereign and parliament cannot make laws to limit the descent of the crown. The knowingly and willfully solemnizing, assisting, or being present at any marriage forbidden by the royal marriage act, is declared by 12 Geo. III. c. 11 to infer a præmunire.

PRÆNESTE. See Palestrina.

PRAGA. See Warsaw.

PRAGMATIC SANCTION, or Rescript, a solemn ordinance or decree of the head of a legislature relating either to church or state affairs. The term originated in the Byzantine empire, and signified a public and solemn decree by a prince, as distinguished from the simple rescript, which was a declaration of law in answer to a question propounded by an individual. This name is given to several important treaties, of which the principal are: 1. An ordinance of Charles VII. of France, in which the rights of the Gallican church were asserted in opposition to the usurpation of the pope in the appointment of bishops. Twenty years later, Louis XI., in order to please pope Pius II., was induced to give up this pragmatic sanction, which was ignominiously dragged through the streets of Rome; but at a subsequent date, a quarrel having arisen between Louis and the pope, the pragmatic sanction was re-enacted. 2. The instrument which settled the empire of Germany in the house of Austria (1439 A.D). 3. The ordinance by which Charles VI., emperor of Germany, having no male issue, settled his dominions on his daughter, the archduchess Maria Theresa, which was confirmed by the diet of the empire, and guaranteed by Great Britain, France, the States General, and most of the European powers. 4. The settlement of the succession of the kingdom of Naples, which was ceded by Charles II. of Spain, in 1759, to his third son and his descendants.

PRAGUE (Ger. *Prag*, Slav. *Praha*), capital of the kingdom of Bohemia, is situated in 50° 5′ n. lat., and 14° 30′ e. long., on the slope of the hills which skirt both sides of the river Moldau, 251 m. n.e. of Vienna by railway. Pop. '69, 157,275. Prague, which ranks as the third city of Austria, presents a highly picturesque appearance from the beauty of its site, and the numerous lofty towers (upward of 70 in number) which rise above the many noble palaces, public buildings, and bridges of the city. It consists of four principal parts: 1. The Kleinseite, chiefly occupied by the public offices, and the residences of the officials; 2 The Hradschin (or palace district), surmounted by the vast imperial castle, and containing some of the most ancient and interesting churches and palaces of Prague; 3. The Jews' quarter, now known as the Josephstadt, which forms the chief business-quarter, and contains numerous churches, ecclesiastical and educational establishments; 4. The "New Town," containing the largest number of streets and open squares, with many modern palaces, charitable institutions, and places of public resort. Prague is surrounded by walls and bastions, and has eight gates The citadel, the ancient residence of the old dukes of Bohemia, is well fortified, and from its elevated position above the Moldau, thoroughly commands the city. Prague has 55

Catholic, and 3 Protestant churches, 15 monasteries, and 10 synagogues. Among the most noteworthy of these are the metropolitan, or St. Veits, with its lofty tower, a fine but unfinished specimen of the Gothic of the 14th c., containing the remains of St. Ludmilla, first duchess of Bohemia, and of seven kings and emperors of Germany, with the grave of St. Wenzelaus, and the silver sarcophagus of St. Nepomuk (see ST. JOHN OF NEPOMUK), a popular saint of Bohemia; St. Nicolas, or the church of the Jesuits, with its many towers and costly decorations; the Thein church, built in 1407; the old Hussite church, with the grave of Tycho Brahe, and its marble monuments of the Slavonic martyrs, Cyril and Methodius. Among the numerous public and other buildings of note in Prague, the following are some of the more interesting: the royal palace, the cathedral, the Theresa institution for ladies, the ancient Byzantine church of St. George, the Hradschin square, with the imposing palaces of the primate, the ex-emperor, and prince Schwarzenberg; the Loretto chapel, with its gorgeously bejeweled church vessels; the vast Czerni palace, now used as an institution of charity; the picture gallery; the Premonstratensian monastery of Strahow; the royal library; and at the summit of the Laurenzberg, the restored church of St. Lawrence. Prague has, however, numerous public gardens and walks in the suburbs, which, with the several royal and noble parks open to the public in the vicinity of the city, afford varied resources for health and open-air recreations. The suburb of Karolinenthal, which is traversed by the great viaduct of the railway, and is of modern growth, has some fine buildings, numerous gardens, barracks, and manufacturing establishments; and somewhat further n. is the great botanical garden, with the neighboring public walks on the Moldau. The university, which is the most ancient in Germany, having been founded in 1348, enjoyed the greatest celebrity in the 15th c., when many thousand scholars came from foreign countries to study in its halls. It is now in a state of activity, after a long period of decay, and has good medical and surgical schools; a library containing 142 000 volumes, and 7.762 manuscripts, of which some are very rare; a fine observatory; museums of zoology and anatomy; a botanical garden, etc. Prague has also 1 polytechnic, 3 gymnasia, Bohemian and German training-schools, and about 20 parish schools. The manufactures include leather, cotton, and linen goods, stockings, printed cottons, machinery of various kinds, beet-root sugar, etc. Prague is the great center of the commerce of Bohemia, and the seat of an important transit trade.

History.—According to popular tradition, Prague was founded in 722 by the duchess Libussa. In the 13th c., its importance was fully recognized; in the 14th and 15th c., its munificently endowed university brought foreigners to it from every part, until the decision of the emperor Wenzelaus to favor Bohemian students more than others drove thousands of the scholars with their professors to other spots, and led to the foundation of universities at Leipsic, Ingolstadt, Rostock, and Cracow. In 1424 Prague was conquered, and almost destroyed by the Hussites, who had made a successful stand against the emperor Sigismund's army; but after the subsequent defeat and submission of the insurgents, the city was rebuilt. In the thirty years' war, it suffered severely, and in 1620 the battle was fought at the White mountain, near the city, in which the elector-palatine, Frederick V., known as the winter king, and son-in-law of James I. of England, was completely defeated, and compelled to renounce his assumed crown, and to give up the town into the power of the emperor. Swedes and imperialists successively gained possession of it during the war; and a century later, during the seven years' war, it again fell into the hands of different victors, having been compelled, in 1744, to capitulate to Frederick the great of Prussia; and until the war of deliverance in Germany, and the downfall of Napoleon, the city continued to suffer more or less directly from the troubles in which the house of Austria had been involved. During the last 60 years, it has, however, made rapid strides, and enjoyed prosperity and quiet, except in 1848, when the meeting of the Slavonic congress within its walls called forth such strongly marked democratic demonstrations on the part of the supporters of Panslavism (q.v.), that the Austrian government dissolved the conclave, and restored quiet by the summary method of causing the old and new town to be bombarded for two days.

PRAIA GRANDE. See RIO DE JANEIRO, PROVINCE.

PRAIRIE (Fr. meadow) was the name given, by the early French explorers of the northern portion of the Mississippi valley, North America, to the vast fertile plains which extend from western Ohio and southern Michigan, across the states of Indiana, Illinois, Missouri, Arkansas, Iowa, Kansas, Nebraska, and Dakota territory, including the southern portions of Wisconsin and Minnesota. These great plains or savannas are sometimes flat, but oftener rolling like the long swells of the ocean, and rise in gradual elevation from 800 to 1500 ft. above the level of the sea. They are drained by numerous rivers, branches of the Ohio, Mississippi, and Missouri, or emptying into lake Michigan, whose channels seem to have been worn to the depth of 50 to 300 ft., with vertical walls or bluffs of limestone, sandstone, displaying in some places banks of clay, sand, and loam, 200 ft. in thickness. Beneath the prairies n.w. of the Ohio are extensive coal-fields, with deposits of iron, lead, etc. The soil is finely comminuted, rich, and extremely fertile, varying in thickness from 1 or 2 ft., to the bottom-lands on the borders of the rivers, which are of great depth and inexhaustible fertility. These plains are destitute of trees, except in isolated groves, a few rocky ridges, and the borders of streams. They are covered with fine grasses, and brilliant flowers of various species of the helianthoid *compositæ*. Water is found from 15 to 30 ft. below the surface. These great prairies, covering an area of about 400,000 sq.m., formerly fed vast herds of buffalo, deer, wild turkeys, prairie-hens or grouse, prairie-dog, squirrel, etc. In the autumn, the dried grasses, fired by the Indians, converted them into seas of flame. The lack of timber is attributed by some to the fineness of the soil. Remains of ancient mounds, fortifications, and cities show that they were, at some distant period, inhabited by a more civilized race than the Indians found by European discoverers. These great rolling plains, or natural pastures, with only the labor of plowing, produce large crops of wheat and maize, and, penetrated by navigable rivers, and crossed by cheaply built railways, they form one of the most easily cultivated and prolific regions of the world, and are capable of sustaining immense populations.

PRAIRIE (*ante*), the French word to signify meadows, and qualified by them in use by distinguishing natural prairie from artificial prairie or meadow. From the vastness of the American prairie, so named by the early French discoverers, it has been erroneously inferred that the name implied great extent of natural meadow. Small prairies are found in the primeval state in nearly every part of the world, and oases of prairie are not infrequent in the midst of the forest lands of the middle states. Prairies of vast extent are also found far above the altitude of 1500 ft. as given in the above article. The great plateaus of Wyoming, Montana, Colorado, and New Mexico, are prairies of a less fertile character, fresher from nature's great processes of erosion, and having too little rainfall to make a rank vegetation. They lie from 2,000 to 7,000 ft. above the sea. Narrow valleys near the sources of the great tributaries of the Mississippi furnish excellent summer pasturage to the height of 10,000 feet. On the line of the Union Pacific railway, mowing machines are used to cut the natural hay in some of these valleys 6,000 ft. above the sea. The prairie called Laramie plains is between 6,000 and 7,000 ft. above the sea. Marsh meadows by the sea side are equally prairies in the original meaning of the word. The origin of the very fertile prairies in the valley of the Mississippi river proper, now mostly under culture, has been the subject of many theories. How soil so rich, upon which most of the trees of the neighboring forests flourish luxuriantly when protected, should have failed to be covered with them in a state of nature is the question. It is answered by vegetable physiologists thus: The excrements of vegetable growths from the roots of trees and plants, and even the annual accumulation of their own leaves after a continuous growth of the same species, become poisonous to the genera which emit them, though perfectly nutritious to plants of different families. It is claimed that the long continuance of forest growth on a rich soil, made constantly richer by its own annual deposits of leaves, dead wood, and excretions from the roots, finally makes it unfit for their growth. Sickliness and decay produce more and more dead wood, so that fires finally destroy utterly what the soil refuses to nourish. Rank weeds and grasses follow, which in their turn, ripe and dry in autumn, make food for new flames that destroy the remnant of tree vegetation, even the young brood of new species which might otherwise hold their ground. Tree-roots cannot long live when their tops are destroyed. Perennials on the other hand have an extraordinary power to preserve life in their roots, under the action of prairie fires. Once in full possession of the soil, it is easy to see that annual autumn fires where there are not animals enough to feed down the summer growth, will not only preserve the ground won from the forest by grasses, but will singe the surrounding forests, and wherever they are sickly from the cause first named, will finally consume them. Ages of continuous growth of grasses and other perennials, and of countless annuals, have assimilated those qualities in the soil that became noxious to trees; and in nature's rotation of crops the soil has again become fitted for their growth. It is only necessary to check the annual prairie fires for a new crop of forests to dominate the grasses. Trees were beginning to resume possession of the prairies when settlements began. The increase of the buffalo decreased the food for autumn fires by so much as they pastured upon the grasses. The moisture of the ground contiguous to streams and the sweetness of the late summer grasses in these places would naturally make spots where trees could have time to get rooted in the absence of fires. Profs. Hall and Whitney ascribe the treeless condition of the prairies to the finely comminuted condition of soils formed out of a sedimentary rock strata, but this theory is entirely unsatisfactory and inconclusive. Dr. Lesquereux, in his geological report for Illinois, supposes that the prairies have all been lake beds, first occupied by aquatic plants, succeeded as they became drier by grasses, the burning of which prevented the rooting of trees. Prof. Winchell claims that the vegetation of the prairies was pre-glacial, that on the subsidence of the glacial drift the seed took and held possession of the soil, etc. Prof. J. S. Newberry suggests a theory of climatic influences as to rainfall, etc., but presents no facts to explain why n.w. Ohio was a dense forest, and in the same latitude, with the same climate, and rainfall, n. Illinois was nearly all prairie. Unquestionably forests require more rainfall and are more likely to be killed out by a repetition of severe droughts than the grasses, but no such differences occur to show cause for the diverse conditions just cited.

Prairies of great extent are found in the southern part of South America, e. of the Andes, similar in character to those of the western states; less fertile than those of the valley of the upper Mississippi, and less subject to extremes of cold than the the table-land prairies of the United States.

PRAIRIE, a co. in e. central Arkansas, drained by the White river, which bounds it on the n., and is navigable, and by Des Arc and Watansaw bayous; traversed by the Memphis and Little Rock railroad; 800 sq. miles. The surface is level and heavily timbered; rice, cotton, and corn are the staples. Co. seat, Stanton.

PRAIRIE DOG, *Arctomys Ludovicianus*, a very interesting species of marmot (q.v.), an inhabitant of some of the western prairies (q.v.) of North America. It is about the size of a squirrel or large rat; and has soft, reddish-gray fur, each hair being red with a white tip. The name prairie dog seems to have been given to it from its frequent utterance of a sound somewhat like the bark of a very young puppy. For the same reason, it is also called the barking squirrel. A more correct name would be barking marmot, or prairie marmot. The prairie dog does not inhabit the rich grass-covered prairies where the buffalo (bison) abounds; but those which, for want of water, exhibit a comparatively scanty vegetation; and in these it is to be found in vast numbers, being gregarious in its habits, burrowing in the ground, and throwing up mounds of earth, on the summit of which the little creature often sits as if on watch. The whole extent of a great level prairie is often covered with these hillocks. "Their number is incredible," says the honorable C. A. Murray, in his *Travels in North America*, "and their cities, for they deserve no less the name, full of activity and bustle." As soon as the hand is raised to a weapon or missile, they pop into their holes, with amazing rapidity, and then wheel round and look out at the enemy. Still more interesting is the frequent association of the prairie dog with the burrowing owl and the rattlesnake in the same burrow; an association which has been variously described as one of strange friendship among very different creatures, in a state of nature; and as of the most opposite character, the owl and the rattlesnake being supposed to prey upon the prairie dog and its young. But in so far as the owl is concerned, this is rendered very doubtful by the fact, that its *casts* seem to show its food to consist entirely of insects. It probably finds the burrows of the marmots its only convenient retreat, and their proper inmates harmless neighbors.

PRAIRIE-DU-CHIEN, a t. of the state of Wisconsin, on the right bank of the Mississippi, 3 m. above the mouth of the Wisconsin, and 165 m. w. from Milwaukee. It is a prosperous and rapidly increasing town, and in its neighborhood are rich copper-mines. Pop. '70, 2,700.

PRAIRIE HEN. See GROUSE.

PRAIRIE SQUIRREL, the popular name of the North American rodents of the marmot family belonging to the genus *spermophilus* (Cuv.). They have a thick-set body, but slenderer than that of the marmot, a long tail, smallish ears, good-sized cheek-pouches, a small claw or flat nail on the thumb, and short legs and toes. When the winters are cold they pass them in a torpid condition, stopping up the mouths of their holes. The California prairie squirrel (*S. beecheyi*, F. Cuv.) is about 11 in. long, of a mottled yellowish-brown color, with a flat hairy tail about 8 in. long, with a slender body, acute ears and head, and coarse, thin fur. This species does much damage to vegetables and grain. Better known is the striped prairie squirrel, common in North America n. of 40°, and called in the n.w. states the gopher. This species lives in shallow burrows on the prairies, and feeds on insects, field-mice, grasses, roots, etc. It is rarely found in well-cultivated fields. It is about 6 in. long, with a brownish-yellow tail, tipped with black, and about 4 in. long. Its color above is dark brown, with yellowish-gray stripes; the lower parts and the tail are brownish-yellow. Its proper name is *spermophilus tredecim-lineatus* (Aud. and Bach.).

PRAIRIE WOLF. See WOLF, *ante*.

PRAJÂPATI (from *prajâ*, creation, created beings; and *pati*, lord) is, in Hindu mythology, a name of the god Brahmâ, but also a name of those divine personages who, produced by Brahmâ, created all existing beings, inclusive of gods, demons, and natural phenomena. Manu knows of ten such *Prajâpatis* engendered, through pure meditation, by the god Brahmâ—viz., Marîchi, Atri, Angiras, Pulastya, Pulaha, Kratu, Prachetas or Daksha, Vasishtha, Bhrigu, and Nârada. The Mahâbhârata, however, leaves out Daksha, Bhrigu, and Nârada; and other varieties occur in the different Purânas. Whereas, also, these "lords of creation," in conformity with Manu, are in some of these works looked upon as the mind-born sons of Brahmâ, some Purânas derive them from different parts of Brahmâ's body. The only interesting point in this theory of the Prajâpatis is the assumption that the world did not immediately proceed from Brahmâ, the highest god, but through the intermediate agency of beings which thus stand between him and creation.

PRAJNÂ PÂRAMITÂ (literally, the wisdom which has gone to the other shore, viz., of its object; i.e., absolute or transcendental wisdom, from the Sanskrit *prajnâ*, wisdom, *pâram*, to the other shore, and *ita*, gone) is the title of the principal Sûtra (q.v.) of the Mahâyâna school of the Buddhists (see BUDDHISM). Its main object is metaphysical; but the commencement of the work is merely a eulogy of Buddha, and of the Bodhisattwas, who form his retinue. Other parts of it contain incidental narratives of wonderful phenomena connected with the apparition of Buddhist saints, or a description of the benefits arising from an observance of the Buddhistic doctrine, or verses in which the Buddha is praised by his disciples, and similar irrelevant matter. It is probably on account of the extent which could easily be imparted to such episodical topics, but also by amplifying the real substance of the work, that several recensions of the Prajnâ Pâramitâ are in existence, both with the Buddhists and Thibetans (see LAMAISM); some of these do not contain more than 7,000 or 8,000 or 10,000 slokas, or paragraphs; but others amount to 18,000, 25,000, or 100,000 slokas. The following may serve as a specimen of the abstruse ideas treated of in this great work of the Buddhistic doctrine: No object has existence or non-existence; nothing belongs to eternity or non-eternity, to pain or pleasure, to vacuity or non-vacuity. All objects are without attributes and with attributes, with and without characteristic marks. Bodhisattwa (the name for a deified saint) and Prajnâ (wisdom) are synonymous terms; such a term neither arises nor perishes; it exists neither inwardly nor outwardly, because it cannot be seized; but the Bodhisattwa must accomplish his career under this fallacious name; it is his duty, however, to look neither upon form nor anything else as an eternal or non-eternal, as a pure or impure matter, etc. Then only when he is in a condition of complete indifference regarding everything, is he capable of encompassing the whole wisdom. . . . The absence of nature is the nature of everything; all objects are separated from their characteristics. All objects neither appear nor are born, nor disappear, nor cease to be, nor are they pure nor impure, nor are they acquirable nor non-acquirable. Want of understanding is the not understanding that objects are nonentities. From the want of understanding proceed all subjective notions; and through the latter one becomes incapacitated from fulfilling the behests of the sacred doctrine, and from entering the path which leads to wisdom. . . . Everything is like the echo, or a shadow, or anything else without substance. In short, the doctrine of the Prajnâ Pâramitâ is the entire negation of the subject as well as the object; and whatever be the difference in detail between the points of view from which it looks upon subject or object, or between its comparisons and circumlocutions, the result is always the same: that the object of ascertainment, or the highest wisdom, has no more real existence than the subject striving to attain to it, or the Bodhisattwa.—See E. Burnouf, *Introduction à l'Histoire du Buddhisme Indien* (Paris, 1844); W. Wassiljew, *Der Buddhismus, seine Dogmen, Geschichte und Literatur* (St. Petersburg, 1860).

PRÂKRIT (from the Sanskrit *prakriti*, nature; hence, natural, not accomplished, vulgar) is the collective name of those languages or dialects which are immediately derived from, or stand in an immediate relation to Sanskrit, or "the accomplished language" (q.v.) of the Hindus. These languages, however, must not be confounded with those modern languages of India which also have an affinity with the Sanskrit language; for, in the Prâkrit languages, however much they may differ from Sanskrit in their phonetic laws, the words and grammatical forms are immediately derived from that language; whereas, in the modern tongues of India, there is not only no connection between their phonetic laws and those of Sanskrit, but their grammatical forms also are wholly different from those of the ancient language; and while many of their words have no Sanskritic origin, even those which have show that they are not immediately drawn from that source. The Prâkrit languages comprise, beside the *Pâli* (q.v.), which generally, however, is not included among them, those dialects which are found in the dramas and in the oldest inscriptions. In the dramas it is women, except female religious characters, and subordinate male personages, who are made to speak in these languages—the use of Sanskrit being reserved for the higher characters of the play—and among the former, again, the choice of the special Prâkrit dialect is adapted by the poet to the rank which such a subordinate personage holds, the more refined dialect being appropriated, for instance, to the wives of the king or hero of the play; an inferior Prâkrit to his ministers; others less in degree to the sons of the ministers, soldiers, town-people, and the like; down to the lowest Prâkrit, which is spoken only by servants, or the lowest classes. A work on the poetical art, the *Sâhityadarpana*, enumerates 14 such Prâkrit dialects—viz., the *Sauraseni*, *Mâhârâshtrî*, *Mâgadhî*, *Ardhamâgadhî*, *Prâchyâ*, *Avantikâ*, *Dâkshinâtyâ*, *Sâkvarî*, *Bâhlîkâ*, *Drâvidî*, *Abhîrî*, *Chândâlî*, *Sâbarî*, and *Paisâchî*; but Vâraruchi, the oldest known grammarian of the Prâkrit dialects, knows but four—viz., the *Mâhârâshtrî*, *Sauraseni*, *Mâgadhî*, and *Paisâchi*; and Lassen, in the *Indische Alterthumskunde*, holds that of those only the *Sauraseni* and the *Mâgadhî* have a really local character—the former, as he assumes, having been the vernacular of a large district of western, and the latter, which is also the Prâkrit in the inscriptions of king Asoka—of eastern India; whereas the Mahârâshtrî, or the language of the Mahrattas, does not seem to have been the language of the country the name of which it bears; and the Paisâchî, or the language of the Pisâcha, is obviously merely a fancy name. The principal Prâkrit dialect is the Mahârâshtrî; the lowest, according to some, the Paisâchî, of which two varieties are mentioned; but, according to others, the *Apabhramoa*—which word originally means "a falling-off"—i.e., a dialect which completely deviates from the grammatical laws of Sanskrit, but in this special application would designate a dialect even inferior to the Paisâchî, and is compared by a grammarian to the language of the reptiles. On the grammar of the Prâkrit languages, see Chr. Lassen, *Institutiones Linguæ Pracriticæ* (Bonn, 1837). The Sûtras, or grammatical rules of Vâraruchi, have been edited in the same work; but more elaborately, with a commentary, copious notes, an

English translation, appendices, and an index, by Edward Byles Cowell, who has also added to this excellent edition *An Easy Introduction to Prâkrit Grammar* (Hertford, 1854).

PRASE, a green variety of quartz (q.v.), sometimes found crystallized in the same forms as common quartz, but more generally massive, or in prismatic and granular concretions. It is rather a rare mineral. It is sometimes cut as an ornamental stone, but is not highly esteemed.

PRATI, GIOVANNI, b. at Dascindo, in the province of Trent, Italy, in 1815; took his degree at Padua. His first poem in 1841, *Edmenegarda*, was received with favor. His other popular poems are: *The Song of the Future; A Hymn to Italy; Rodolfo; Count Riga; Ballate; Memorie e Lacrime; Ariberto*, 2 vols. Complete editions of his writings were published at Florence and Milan. In 1862 he became a member of the Italian parliament.

PRATINCOLE, a genus (*glareola*) of wading birds (order *grallatores*) of the plover family (*charadridæ*) found in the temperate and warmer parts of the old world. They frequent the borders of rivers, lakes, and marshes, and feed upon worms and insects, picking them up or capturing them in the air. They are swift either upon the foot or wing. The nest is made upon the ground among thick grass or shrubs, and they lay from three to four eggs. Most of the species are about 9 in. long, from beak to end of tail.

PRATIQUE is, strictly, a limited quarantine. A ship is said to have performed pratique when her captain has convinced the authorities of a port that his ship is free from contagious disease; and he is thereupon permitted to open trade and communication with the shore.

PRA'TO—often, for distinction, called PRATO IN TOSCANA—a t. of Italy, in the province of Florence (*Firenze*), 10 m. n.w. of Florence, in a fertile plain, on the right bank of the Bisenzio, a feeder of the Arno, and on the railway between Florence and Pistoja. There are manufactures of straw-plait, woolen cloth, cotton goods, silk thread, etc.; also soap-works, tanneries, and copper-works. Copper-mines of considerable productiveness exist in the neighborhood. Pop. '71, 12,900.

PRATT, an unorganized co. in s.w. Dakota, drained by White river; about 3,000 sq. miles.

PRATT, a co. in s. Kansas, watered by the Ninnescah and other branches of the Arkansas river; about 950 sq.m.; pop. '80, 1890—1749 of American birth. The surface is level, with little timber. The soil is fertile. The principal productions are corn, wheat, oats, rye, and grass. Co. seat, Prattsville.

PRATT, BENJAMIN, 1710–63; b. Cohasset, Mass.; graduate of Harvard university, 1737; studied law; rose rapidly in his profession and became a distinguished member of the bar. He represented the district of Boston (which he had made his home) in the Massachusetts general court, 1757–59, and subsequently through his intimacy with gov. Pownall received the appointment of chief-justice of New York. He married the daughter of judge Robert Auchmuty, then a resident of Roxbury. He was a profound scholar and painstaking collector of historical data, which he intended to publish as a history of New England, but his death took place while the work was incomplete.

PRATT, CHARLES. See CAMDEN, EARL OF, *ante*.

PRATT, DANIEL JOHNSON, PH.D., b. Westmoreland, N.Y., 1827; graduate of Hamilton college, 1851; had charge of the Fredonia academy for ten years, and became assistant secretary to the regents of the university of New York. In 1869 he was recording secretary of the Albany institute. The plan of the annual meeting of all the professors in the colleges and academic institutions in New York, which has proved of great advantage to the cause of education, originated with him. He wrote the *Annals of Public Education in the State of New York from* 1626 *to* 1800; and was one of the authors of the *History of the Boundaries of the State of New York*, 2 vols. He has also published several pamphlets on historical and educational subjects.

PRATT, ORSON, b. Conn., 1811; joined the Mormon church, and is now one of the 12 apostles; professor of mathematics in Deseret university, and church historian; has been for several years speaker of the Utah house of representatives. He is the author of *Cubic and Bi-Quadratic Equations; The Great First Cause; The Absurdities of Immaterialism;* and some religious pamphlets.

PRATT, PHINEHAS, 1590–1680; b. England; came with Weston's colony to New England in 1622, and settled at the place afterward called Weymouth; left it in 1623 on the failure of the colony, and fled to Plymouth, 30 m. distant, pursued by the Indians. He resided many years in the Plymouth colony, and afterward in Charlestown, Mass. In 1662 he addressed a petition to the general court, accompanied with a narrative which he called *A Declaration of the Affairs of the English People that first Inhabited New England*. He was the ancestor of a large New England family.

PRATT, ZADOCK, 1790–1871; b. New York; began business in 1812 as a saddler and harness-maker; in 1817 devoted himself with success to tanning, and in 1824 located a tannery in the place which is now Prattsville. In 1836 and again in 1842 he was elected to congress, where he exerted himself for the reduction of postage, and for the new post-office buildings. To him the bureau of statistics owes its origin.

PRAWN, *Palæmon*, a genus of crustaceans, of the order *decapoda*, and sub-order *macroura*, in general form resembling lobsters, crayfish, and shrimps, but belonging to a family (*palæmonidæ*) remarkable for a long serrated beak projecting from the carapace. The upper antennæ are terminated by three filaments. There are many species of prawn, and some of those which inhabit the seas of warm climates attain a large size. Many of them are semi-transparent, and exhibit very fine colors; they are also very active creatures, and most interesting inmates of an aquarium, but are excessively voracious, and apt to make great havoc among its other inhabitants. The COMMON PRAWN (*P. serratus*) attains a length of 3 or 4 in. It is common on the British coasts, although not so abundant as the shrimp, and is generally taken in the vicinity of rocks at a little distance from the shore, and not in rock-pools. It is more esteemed for the table than even the shrimp. Osier-baskets, similar to those employed for catching lobsters, are employed for the capture of prawns; also nets about 5 or 6 ft. wide, which are pushed along by means of poles, and are called *putting nets*. One side of the thorax of a prawn is often found remarkably distended. This is owing to a parasitic crustacean, *bopyrus crangorum*, one of the *isopoda*, lodged under the carapace.

PRAXIT'ELĒS, a celebrated sculptor of ancient Greece, of whose life nothing is known, except that he was a citizen of Athens, and lived in the 4th c. B.C. Pliny gives the date 364 B.C. apparently as that in which Praxitelés began to flourish. His principal works—all of which have now perished—were: 1. Statues of Aphrodite (at Cos, Cnidus, Thespiæ, Latmian Alexandria, and Rome), of which that of Cnidus was the most famous; 2. Statues of Eros (at Thespiæ, and Parium on the Propontis); 3. Statues, single and in groups, from the mythology of Dionysus (at Elis, Athens, Megara, and other places); 4. Statues of Apollo, the best of which was that representing Apollo as the lizard-slayer. So far as we are entitled to form an opinion of the works of Praxitelés from the descriptions and criticisms of ancient writers, it would seem that they marked an epoch in the history of Greece—viz., the transition from the earnest, heroic, and reverential age preceding the Peloponnesian war, to the more corrupt and sensual times that followed it. The sculpture of Pheidias is inspired by a profound veneration for the majesty of the gods; that of Praxitelés sought to give expression to the looser and less divine conceptions of the national religion. The bewitching beauty of woman, and the intoxication of Bacchic pleasures, were his favorite subjects; but in his treatment of these, he displayed unrivaled sweetness, grace, and naturalness. His gods and goddesses were not very divine, but they were ideal figures of the fairest earthly loveliness.

PRAY, ISAAC CLARK, 1813–69; b. Boston; educated at Amherst college. He was on the staff of the *Journal of Commerce* and the *Herald* in Boston. He was a successful theatrical manager, and among the persons whom he trained for the stage was Charlotte Cushman. He appeared in a number of English and Irish theaters, and produced a successful play, *Virginius*, and a number of dramas and burlesques. He was the author of *Poems* (1837); *Book of the Drama* (1851); *Memoirs of James Gordon Bennett and his Times;* and other works.

PRAYER is a universally acknowledged part of the worship due to God; a simple and natural expression of dependence, which seems almost necessarily to follow from a belief in the existence of a god. Accordingly, we find it both where the object of worship is one supreme Being and in systems of polytheism. It is also combined with every other part of worship. According to the Christian system, however, prayer is not the mere spontaneous approach of man to God, in the endeavor to appease his wrath, to win his favor, or to obtain from him any blessing; but the right to approach him in prayer, and the warrant to expect advantage in doing so rest on the revelation of his own will. Nor is any truth more indisputably taught in the Bible, or more frequently brought into view, both in the Old and in the New Testament, than that God is the *hearer* of prayer.

But a difficulty presents itself, in respect to what may be called the theory of prayer. How can prayer be supposed to influence the divine mind or will? How can a belief in its power be reconciled with any view of the divine decrees, from the most absolute doctrine of predestination to the most modified scheme which recognizes the Creator as supreme in the universe? Such questions bring up the same difficulty which attends all other questions of the relations between the human will and the divine, the freedom of man and the sovereignty of God. But whatever seeming inconsistencies may be implied in speculation concerning them, the necessity of prayer and the power of prayer are acknowledged equally by men of the most opposite views; and generally with an acknowledgment of the inability of the human mind to solve some of the problems which are thus presented to it. The extreme predestinarian includes prayer among the means decreed of God along with the end to which it contributes. And while prayer is regarded by all Christians as of great value in its reflex influence on the feelings of the worshiper, this is scarcely ever stated as it whole value; however important this view of it may be deemed as illustrating the divine wisdom in making it one of the chief "means of grace."

Prayer being regarded by Christians as an *ordinance* of God, it follows that they must seek to be guided in prayer by the rules of his revealed will, in so far as his will has been revealed. It is therefore held by Christians in general, in accordance with their doctrine of the atonement (q.v.) and of the intercession (q.v.) of Jesus Christ, that the only true way of access to God is through the mediation of Jesus Christ, and that prayer must be made in the exercise of faith in him; the worshiper taking his stand upon the ground of the obedience or "finished work and accepted sacrifice" of Christ, and looking up to Christ as now interceding in heaven. It is also held, in accordance with the doctrine of man's corruption, that prayer can be truly made, in faith, and for things agreeable to God's will, only by the help of the Holy Spirit. Prayer, to be acceptable, must be for things agreeable to God's will, as that will is revealed in his Word; and therefore prayer for mere temporal or earthly good must be made in entire submission to his will; but prayer may be thus made for temporal or earthly good, the will of God having been revealed to that effect—an admirable instance of the grace of God.

Adoration, thanksgiving, and confession of sins, the accompaniments or adjuncts of prayer, are very generally regarded as parts of prayer; and prayer, which is strictly mere *petition*, is defined accordingly.

The Protestant churches all hold that prayer is to be made to God alone; the mediation of Jesus Christ and the help of the Holy Ghost being duly acknowledged. But in the Roman Catholic church, and to some extent in the oriental churches, prayer of a kind is made also to saints, the virgin Mary, and angels. See INVOCATION.

Prayer, according to Christians in general, must be made not merely in forms or words, but with the heart. Accordingly, Protestants hold that prayer ought to be conducted in a language known to the worshipers. The church of Rome has, on the contrary, maintained the general use of the Latin language, where that language is unknown to most of the worshipers.

Prayer for the dead (see following article) is rejected by Protestants, as having no warrant in the Word of God. But according to the Protestant creed, prayer is to be made for all the living—not only for believers but for unbelievers.

PRAYER FOR THE DEAD, the practice which prevails in the Roman Catholic, Greek, and other oriental churches of praying for the souls of the deceased, with the intention and expectation of obtaining for them an alleviation of their supposed sufferings after death, on account of venial sins, or of the penalty of mortal sins, remitted but not fully atoned for during life. The practice of praying for the dead supposes the doctrine of purgatory (q.v.), although perhaps the converse is not necessarily true. Practically, however, the two may be regarded as forming part of one and the same theory, and especially if taken in connection with the doctrine of the communion of saints. It being once supposed, as the Roman Catholic system supposes, that relations subsist between the two worlds, that their members may mutually assist each other, it is almost a necessary consequence of the doctrine of purgatory that the living ought to pray for the relief of their suffering brethren beyond the grave. We can but present an outline of this doctrine and of its history. It seems certain that some such doctrine existed in most of the ancient religions, and especially in those of Egypt, India, and China. It gives significance to many of the practices of the Greeks and Romans in reference to their dead. Its existence among the Jews is attested by the well-known assurance in 2d Maccabees, chap. xii., that "it is a holy and wholesome thought to pray for the dead, that they may be loosed from their sins." The continued maintenance of the practice among the Jewish race is plain from their sacred books; and a still more interesting evidence of its use has recently been discovered in the inscriptions disinterred in several Jewish catacombs of the first three centuries, at Rome and in southern Italy, which abound with supplications: "May thy sleep be in peace!" "Mayest thou sleep in peace!" "Thy sleep be with the good!" or "with the just!" etc. Roman Catholics contend that the doctrine, as well as the practice, is equally recognizable in the early Christian church. They rely on the parable of Lazarus and the rich man (Luke xvi. 19–31) as establishing the intercommunion of this earth with the world beyond the grave; and on Matt. xii. 32, as proving the remissibility of sin or of punishment after death; as well as on 1st. Cor. xv. 29, as attesting the actual practice, among the first Christians, of performing or undergoing certain ministrations in behalf of the dead. The fathers of the 2d, 3d, and still more of the 4th and following centuries, frequently allude to such prayers, as Clement of Alexandria, Tertullian, St. Cyprian, and especially St. John Chrysostom, Cyril of Jerusalem, and St. Augustine. The liturgies, too, of all the rites without exception contain prayers for the dead; and the sepulchral inscriptions from the catacombs, which reach in their range from the 1st till the 5th c., contain frequent prayers in even greater variety, and more directly intercessory, or rather more directly implying release from suffering than those of the contemporary Jews. In the services of the mediæval and later church, prayers for the dead form a prominent and striking element. See REQUIEM. The Abyssinians have separate services for the dead of all the several conditions and degrees in life, and continue to offer the mass daily for 40 days after the death. The Protestant churches without exception have repudiated the practice. In the burial-service of the first book of common prayer, authorized in the church of England, some prayers for the deceased were retained; but they were expunged from the second book; and no trace is to be found in that sanctioned under Elizabeth.

PRE-ADAMITES, supposed inhabitants of the earth anterior to Adam. The author of the opinion, or at least the writer in whose hands it first took a scientific form, was Isaac de la Peyrere, better known by his Latinized name *Pererius*. He was born of a Calvinist family of Bordeaux in 1594, and was attached to the service of the prince of Condé. His theory was first made public in 1655, in the form of a commentary on the 12th, 13th, and 14th verses of the 5th chapter of St. Paul's Epistle to the Romans, which was followed, in the same year, by the first part of a formal treatise on the pre-Adamite hypothesis, and the theological consequences to be derived therefrom. According to his hypothesis Adam was the progenitor of the Jewish race only, and it is only of him and his race that the Bible is designed to supply the history. Other races existed on earth before that of Adam; but of them the Bible contains no record, nor did the Mosaic law regard them or impose any obligation upon them. It was only under the gospel that they began to be comprehended in the law, which through Christ was given to all the human races of the earth; and it is in this sense that, according to Peyrere, sin is said (Rom. v. 13) to "have been in the world until the law," but not to have been "imputed when the law was not." For the pre-Adamite race, as the law was not, there was no *legal* offense. The only evil which Peyrere recognized was natural evil. The same limited interpretation he extended to most other details of the Mosaic history. Thus he regarded the deluge as partial, being confined only to the Adamite race. Other miraculous narratives of the Pentateuch and even of other books he restricted similarly. As his book was published in the Low Countries he fell under the animadversion of the inquisition, and eventually was arrested in the diocese of Mechlin, but was released at the instance of the prince of Condé. He afterward went to Rome, where he conformed to the Catholic religion, and made a full retractation of his erroneous opinions. He was offered preferment by the pope, Alexander VII.; but returned in preference to Paris, where he entered the seminary of Notre Dame des Vertus, in which he resided till his death in 1676. The discussion has acquired new interest by recent discoveries of supposed evidences of human art and industry, in positions which, considered geologically, appear to their discoverers to be of an age beyond those limits which the Mosaic chronology assigns to the creation of Adam.

PREBEND (Lat. *præbenda*, from *præbere*, to furnish), the income or other provision assigned for the maintenance of a so-called prebendary, out of the revenue of a cathedral or collegiate church. After the definite constitution of chapters for the maintenance of the daily religious services in the bishop's church, or in other churches similarly established, endowments were assigned to them, which were to be distributed (*præbendæ*) in fixed proportions among the members. These portions were called *portiones canonicæ* or *præbendæ*. To the prebend was commonly attached a residence. The person enjoying a prebend is called a prebendary.—The name prebend is also given to an endowment assigned to a cathedral church for the maintenance of a secular priest.

PREBLE, a co. in s.w. Ohio, bordering on Indiana on the w.; drained by several creeks, and traversed by the Cincinnati, Richmond and Chicago, and the Dayton and Union railroads; 450 sq.m.; pop. '80, 24,534—23,509 of American birth. The soil is fertile; tobacco, corn, wheat, oats, wool, pork, and cattle are the staples. There are manufactures of lime, clothing, brick, and other articles. Co. seat, Eaton.

PREBLE, EDWARD, 1761–1807; b. Maine; joined a privateer 1777, and 2 years later, entered the Massachusetts navy. He was captured and imprisoned on the *Jersey* in New York harbor; and from the time of his release till the close of the war was on the *Winthrop*. While attached to this vessel, he boarded, with only 14 men, a British brig. at Castine, Maine, and took her out in the face of a battery. In 1799 he was appointed capt., and in command of the *Essex* convoyed from Batavia a fleet of merchant vessels. In 1803 he commanded the squadron against Tripoli, and in November of that year, began the blockade of Tripoli. He attacked the Tripolitan gun-boats, Aug. 3, 1804, captured 3, and sunk 3. Four days later, he made another attack, but lost one of his own gun-boats. On the 28th of the same month, 8 American boats fought 13 Tripolitan, sinking 1 of the latter, and driving 1 ashore. The Tripolitans succeeded in raising their vessels which had been sunk, before Preble again attacked them, Sept. 3. He stationed his flag ship the *Constitution*, where 70 guns bore upon her, and she was finally obliged to retire. A large quantity of powder, shell, and shot was put on the *Intrepid*, and she was taken by a force of volunteers into the harbor to be exploded. She was, however, fired upon by the batteries, and prematurely exploded. All on board were killed. The Tripolitans lost 1 gun-boat, but the American loss was proportionately much greater. A few days afterward, Preble was relieved by commodore Barron.

PREBLE, GEORGE HENRY, b. Maine, 1816; entered the navy in 1835. He was made lieut. in 1848, after serving in the Seminole and Mexican wars. He was in the attack on Alvarado in 1846, and at Tampico and Vera Cruz the next year. In 1854, in command of the sloop *Macedonian* he fought the Chinese pirates. During the war of the rebellion he was in command of the *Katahdin* at the capture of New Orleans; and of the *St.*

Louis, in the blockade squadron 1863-65. He was promoted capt. in 1867, and commodore in 1871. He is the author of a *History of the American Flag*, 1872.

PREBLE, JEDEDIAH, 1707-84, b. Maine; removed to Portland, 1748. He was a capt. in the regiment of gen. Samuel Waldo, 1746; went to Acadia as a lieut.col. with gen. Winslow in 1755, and was made brig.gen., 1759. He was for a number of years a member of the state house of representatives, served in the state and executive council, and was appointed a justice of the court of common pleas in 1778.

PRECED'ENCE, the order in which individuals are entitled to follow one another in a state procession or on other public occasions. We find questions of precedence arising in very early ages both in Europe and in the east. Where such questions have arisen among ambassadors, as the representatives of different countries, great tenacity has often been shown in supporting the claims to rank of the states represented. In England, the order of precedence depends partly on the statute 31 Henry VIII. c. 10, partly on subsequent statutes, royal letters patent, and ancient usages. Among questions of precedence depending on usage, there are some which can hardly be considered so settled as to be matter of right, and are in a great degree left to the discretion of the officers of the crown. Formerly, they were adjudicated on by the constable and marshal in the court of chivalry; and since that tribunal has fallen into abeyance, the practice of persons aggrieved in these matters is to petition the crown, which generally refers the disputed question to the officers of arms. In Scotland, the Lyon court has the direct jurisdiction in all questions of precedence.

It is a general rule of precedence, that persons of the same rank follow according to the order of the creation of that rank; and in the precedence of the English peerage, it has been fixed that the younger sons of each preceding rank take place immediately after the eldest son of the next succeeding rank. Married women and widows take the same rank among each other as their husbands, except such rank be professional or official, and it is an invariable rule that no office gives rank to the wife or children of the holder of it. Unmarried women take the same rank with their eldest brother; the wife of the eldest son, of any degree, however, preceding the sisters of her husband and all other ladies in the same degree with them. Marriage with an inferior does not take away the precedence which a woman enjoys by birth or creation; with this exception, that the wife of a peer always takes her rank from her husband. The following tables exhibit the precedence of different ranks as recognized by law in England.

TABLE OF PRECEDENCE AMONG MEN.

The sovereign.
The prince of Wales.
Sons of the sovereign.
Grandsons of the sovereign.
Brothers of the sovereign.
Uncles of the sovereign.
The sovereign's brothers' or sisters' sons.
The archbishop of Canterbury, primate of all England.
The lord high chancellor, or lord keeper, being a baron.
The archbishop of York, primate of England.
The present archbishop of Armagh, by the Irish church act (1869).
The archbishop of Dublin.
The lord high treasurer.
The lord president of the privy council.
The lord privy seal.
The lord great chamberlain.
} Being of the degree of barons.
The lord high constable.
The earl marshal.
The lord high admiral.
The lord steward of her majesty's household.
The lord chamberlain of her majesty's household.
} Above all of their degree; if dukes, above all dukes, etc.
Dukes.
Eldest sons of dukes of the blood royal.
Marquises.
Dukes' eldest sons.
Earls.
Younger sons of dukes of the blood royal.
Marquises' eldest sons.
Dukes' younger sons.
Viscounts.
Earls' eldest sons.
Marquises' younger sons.
Bishops of London, Durham, and Winchester.
All other English bishops according to seniority of consecration.
The present bishop of Meath, and then the other Irish bishops existing in 1869, according to seniority of consecration.
Secretaries of state, if of degree of a baron.
Barons.
The speaker of the house of commons.
Commissioners of the great seal.
Treasurer of her majesty's household.
Comptroller of her majesty's household.
Master of the horse.
Vice-chamberlain of her majesty's household.
Secretaries of state, under the degree of baron.
Viscounts' eldest sons.
Earls' younger sons.

Barons' eldest sons.
Knights of the garter.
Privy councilors.
The chancellor of the order of the garter.
The chancellor of the exchequer.
The chancellor of the duchy of Lancaster.
The lord chief justice of the queen's bench.
The master of the rolls.
Lord chief justice of the common pleas.
Lord chief baron of the exchequer.
Lords justices of the court of appeal in chancery.
Vice-chancellors.
Judges and barons of the degree of the coif of the said courts, and judge of the court of probate.
Bannerets made by the sovereign under the royal standard in open war.
Viscounts' younger sons.
Barons' younger sons.
Baronets.
Bannerets not made by the sovereign in person.
Knights grand crosses of the bath.
Knights grand crosses of the star of India.
Knights of St. Patrick.
Knights grand crosses of St. Michael and St. George.
Knights commanders of the Bath.
Knights commanders of the star of India.
Knights commanders of St. Michael and St. George.
Knights bachelors.
Companions of the bath.
Companions of the star of India.
Cavalieri and Companions of St. Michael and St. George.
Eldest sons of the younger sons of peers.
Baronets' eldest sons.
Eldest sons of knights of the garter.
Bannerets' eldest sons.
Eldest sons of knights of the bath, and of St. Michael, and St. George.
Eldest sons of knights bachelors.
Baronets' younger sons.
Younger sons of knights of the garter.
Younger sons of bannerets.
Younger sons of knights of the bath.
Younger sons of knights bachelors.
Esquires.
Gentlemen entitled to bear arms.
Clergymen, barristers-at-law, officers in the army and navy, who are all gentlemen, and have their precedency in their respective professions.
Citizens.
Burgesses.

Table of Precedence among Women.

The queen.
The princess of Wales.
Princesses, daughters of the sovereign.
Princesses and duchesses, wives of the sovereign's sons.
Granddaughters of the sovereign.
Wives of the sovereign's grandsons.
The sovereign's sisters.
Wives of the sovereign's brothers.
The sovereign's aunts.
Wives of the sovereign's uncles.
Duchesses.
Wives of the eldest sons of dukes of the blood royal.
Daughters of dukes of the blood royal.
Marchionesses.
Wives of the eldest sons of dukes.
Daughters of dukes.
Countesses.
Wives of the younger sons of dukes of the blood royal.
Wives of the eldest sons of marquises.
Daughters of marquises.
Wives of the younger sons of dukes.
Viscountesses.
Wives of the eldest sons of earls.
Daughters of earls.
Wives of the younger sons of marquises.
Baronesses.
Wives of the eldest sons of viscounts.
Daughters of viscounts.
Wives of the younger sons of earls.
Wives of the eldest sons of barons.
Daughters of barons.
Maids of honor.
Wives of knights of the garter.
Wives of bannerets.
Wives of the younger sons of viscounts.
Wives of the younger sons of barons.
Wives of baronets.
Wives of knights grand crosses of the order of the bath.
Wives of knights grand crosses of St. Michael and St. George.
Wives of knights commanders of the order of the bath.
Wives of knights commanders of St. Michael and St. George.
Wives of knights bachelors.
Wives of companions of bath.
Wives of cavalieri and companions of St. Michael and St. George.
Wives of the eldest sons of the younger sons of peers.
Daughters of the younger sons of peers.

Wives of the eldest sons of baronets.
Daughters of baronets.
Wives of the eldest sons of knights of the garter.
Daughters of knights of the garter.
Wives of the eldest sons of bannerets.
Daughters of bannerets.
Wives of the eldest sons of knights of the bath.
Daughters of knights of the bath.
Wives of the eldest sons of knights bachelors.
Daughters of knights bachelors.
Wives of the younger sons of baronets.
Wives of esquires and gentlemen.
Wives of citizens.
Wives of burgesses.

At the coronation of Charles I., the rule of precedency of the nobility of England was introduced in Scotland; and it was arranged that peers of England (or their sons, etc.), of a given degree, should within England take precedence of peers of Scotland of the same degree; and that this precedence should be reversed in Scotland. But by the acts of union of Scotland and Ireland, the precedence in any given degree of the peerage has been established as follows: 1. Peers of England; 2. Peers of Scotland; 3. Peers of Great Britain; 4. Peers of Ireland; 5. Peers of the United Kingdom, and peers of Ireland created subsequently to the Irish union. A similar order is understood to obtain in regard to baronets, though in Ireland it seems lately to have become the practice to allow all baronets to rank according to the respective dates of their patents. The relative ranking of the great officers of the crown in Scotland was thus settled by statute in 1623 and 1661:

Lord chancellor.
Lord treasurer.
Archbishop of St. Andrews.
Archbishop of Glasgow.
Earls and viscounts according to their ranks.
Bishops according to their ranks.
Lord privy seal, } first of their rank.
Lord secretary, }
Lord president of the court of session.
Lord register.
Lord advocate.
Lord justice clerk.
Lord treasurer depute.
Lords of session, according to their admission.
Barons and gentlemen, being councillors, according to their admission.

The right of the judges of the court of session, in Scotland, to precede baronets has been generally admitted. Lyon king of arms has precedency "before all knights and gentlemen within the kingdom, not being officers of state, or senators of the college of justice." It seems to be held in England that the precedence of Scotch officers of state, judges, etc., as recognized before the union, does not now extend beyond Scotland.

There are rules for precedence for the members of different professions, recognized among themselves, but which do not confer general social precedence. Doctors in the universities rank thus: 1. Of divinity; 2. Of law; 3. Of medicine.

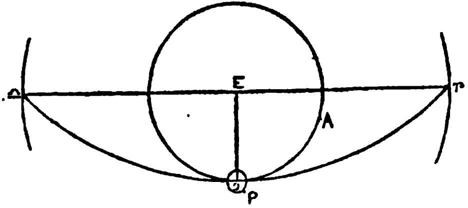
PREC'EDENTS, in law; legal acts or instruments which, as establishing a point of law, are to be followed in subsequent cases in which analogous facts occur. Forms of procedure long used by the courts or the profession also are called precedents. In respect to the action of courts, precedent means an "adjudged case followed by a court in subsequent cases." Blackstone says that a previous decision is to be followed, unless "manifestly absurd or unjust." Among the considerations which go toward determining whether a decision be accepted as a precedent are "the justice of its principle, and the reasonableness of its application, the time during which it has been unquestioned, the general course of the decisions," etc. Lord Talbot said, it is much better to stick to the known general rules than to follow any one particular precedent.

PRECEN'TOR (Lat. *præ*, before; and *cantor*, a singer), the official in a chapter, whether cathedral or collegiate, whose duty it was to lead the singing. He commenced the psalm or hymn, which was taken up, and repeated either by the celebrant or another of the body, or by the rest of the choir. In modern chapters, the precentor ranks next in dignity to the provost or dean. Among the Presbyterian bodies, the precentor is the official who raises and conducts the psalmody, and is generally provided with a desk immediately beneath the pulpit.

PRECEPT, a legal term, used in Scotch law, in certain departments, generally signifies an order to do something. Thus, a precept of sasine is an order by the superior of lands to his bailie to infeft the vassal. A precept of *clare constat* is an order by a superior to infeft the vassal's heir, so called because the superior is quite satisfied of the propinquity.

PRECEPTORY, the name given to certain houses of the knights templar, the superiors of which were called knights preceptor. All the preceptories of a province were subject to a provincial superior, called grand preceptor; and there were three of these who held rank above all the rest, the grand preceptors of Jerusalem, Tripolis, and Antioch. Other houses of the order were called "commanderies."

PRECESSION. If the earth were truly spherical and homogeneous; or if it were composed of spherical layers each of uniform density; or, more generally, if it were such that the resultant of the attractions exerted on all its parts by any other body should always pass through a definite point in its mass, its diurnal rotation would not be affected by the attraction of any other bodies. If originally rotating about a principal axis of inertia (q.v.), it would forever revolve about it, and the direction of the axis would remain fixed in space. To put this in more popular language, the pole-star (q. v.) would always be the same star. But, although the earth rotates about an axis almost exactly coinciding with its axis of figure, the attraction of various bodies, especially the sun and moon, on the oblate portion at the equator, tends to give it a rotation about an axis *in* the plane of the equator; and the combination of these two rotations gives rise to a shifting of the instantaneous axis of rotation in the earth and also in space. As already mentioned (see NUTATION), the earth's axis of revolution describes a waved curve (very nearly circular) about the pole of the ecliptic, and in a direction contrary to that of the order of the signs of the zodiac (q.v.). This waved curve may be conceived to be described as follows: The pole of the earth, P, revolves in about 19 years in a little ellipse, whose center, O, travels uniformly in a small circle of the sphere, AO; the center, E, of the latter is the pole of the ecliptic. The precession is the portion AO of this circle measured from any assumed point, A; and the small arc, OP, by which the true place of the earth's pole differs from its mean place, is the nutation. The nutation is generally resolved along, and perpendicular to, EO; and the components so found are the nutation in ecliptical latitude and longitude. This rough sketch is intended merely to show the *nature* of the phenomenon, for the curve described by P about O is only approximately elliptic. Its greatest radius-vector, however, is exceedingly small, amounting only to about eighteen *seconds* of arc. AO, also, is not exactly circular, but very nearly so, as its radius, EO, is the *obliquity of the ecliptic* (q.v.), which we know varies very little from the angle 23° 28′. The equinoxes, being 90° distant from E, and also from O, which may be taken as the mean place of P, are at ♎ and ♈ in the diagram. And as O moves round E in the reverse order of the signs, so do the equinoxes, and in the same period—viz., 25,868 years. The effect is, of course, that while the earth's pole describes the small circle, AO, in the heavens, about the pole of the ecliptic, the equinoxes make one complete revolution in the ecliptic against the order of the signs. Thus, in turn, all stars lying near the circle AO become, each for a time, the *pole-star* (q.v.). It may seem strange that the term precession should be applied to a retrograde motion; but, from the point of view of the observer, it is evident that the equinox, if on one day it arrive at the meridian of a place simultaneously with a fixed star, will next day arrive at the meridian *sooner* than the star, or will precede it in time of transit; and this is the origin of the term.



The physical explanation of the cause of precession is almost identical with that of the conical motion of the axis of a top about the vertical; the difference between the two being that, in the case of the top, the conical rotation of the axis takes place in the *same* direction as the rotation of the top about the axis, while in the case of the earth, the pole of the axis turns about the pole of the ecliptic in the *opposite* direction to that in which the earth revolves about its axis. But the circumstances of the earth's motion are easily procured by a modification of the spinning-top, such as that of Troughton (used for the determination of latitudes at sea), if the center of gravity of the whole mass be depressed *below* the point of suspension. If the axis of a top be vertical, there is no precession; similarly, when the sun or moon is in the plane of the equator, no effect is produced by them on the position of the earth's axis. When the axis of the common top is inclined, gravity tends to make it fall over: in similar circumstances, it tends to restore the axis of Troughton's top to the vertical; in either case tending to give the top a rotation about a horizontal axis perpendicular to that about which it is at the instant rotating; and the effect on the top is to cause a slow conical motion of its axis about the vertical. The sun or moon, in like manner, when not in the plane of the equator, tend to make, by their attraction, the earth turn about an axis perpendicular to that about which it is actually rotating. It is the composition of these rotations which gives rise to precession; but, though it would not be difficult to give a satisfactory investigation of the question without using formidable mathematical methods, the length of such an investigation prevents our giving it here. The simplest approximation we can give to the physical explanation, that originally given by Newton, must therefore suffice. We have seen (see PERTURBATIONS) that the node of a satellite's orbit tends always to *regrede* on the plane of relative motion of the primary and the disturbing body. Suppose, for an instant, the protuberant parts of the earth at the equator to be satellites, revolving about a *spherical* earth. The effect of the sun's or moon's disturbing force upon these satellites would be to make the nodes of their orbits regrede. And exactly the same result will follow if they be attached to the earth, only that the rate of regression will now be much slower, as the whole mass of the earth will share in the motion. This is one of the most ingenious of the wonderful series of explanations of celestial phenomena which were given in the *Principia*.

PRECIOUS STONES, a name almost synonymous with gems (q.v.) in its widest sense, and partially extended to stones of larger size employed for ornamental purposes, but not to those which are used in architecture.

PRECIPITATION, in chemistry, is an operation in which decomposition occurs in a fluid, either through the action of the air, or of a gas, or of a chemical agent in solution; and is accompanied by the deposition of a solid substance that was previously held in solution. The substance employed to produce the precipitation is called the *precipitant*, and the substance which is separated by its action the *precipitate*. For example, if a solution of carbonate of protoxide of iron be exposed to the air, a precipitate of hydrated sesquioxide or peroxide of iron speedily falls; if a current of sulphureted hydrogen gas be passed through a solution of acetate of lead, a black precipitate of sulphide of lead is thrown down from the clear and colorless solution; and if a solution of corrosive sublimate (bichloride of mercury) be added to a solution of iodide of potassium, a yellow precipitate of biniodide of mercury is thrown down. The precipitant must be added with caution, as, in many cases, an excess of it re-dissolves the precipitate. In qualitative analysis—that is to say, in determining the presence of substances without reference to their quantity—the color, solubility, etc., of the precipitate thrown down by numerous tests, as sulphureted hydrogen, solutions of nitrate of silver, iodide of potassium, ferro-cyanide of potassium, etc., afford the most useful information; and in quantitative analysis, the amount of precipitate thrown down from a given quantity of a solution is often employed to determine the strength of the latter. For example, if a solution of nitrate of silver is added to an ounce of a solution of hydrocyanic acid of unknown strength, till no further precipitation ensues, we may readily calculate, from the weight of the white precipitate of cyanide of silver, how much anhydrous hydrocyanic acid was present.

PRECOCITY has been regarded as an indication of cerebral disease; and American physicians have not hesitated to identify this manifestation with chronic inflammation of the membranes of the brain. If it is not always it is often associated with such intense activity of the whole system, and with morbid conditions, such as the scrofulous diathesis as to usher in actual disease, premature decay, and early death. The decay often consists in mental feebleness and fatuity; or, where no such formidable issue follows, in the reduction of what promised to be transcendent genius to commonplace mediocrity. The closing chapters of the history of many wonderful calculators—infant Rosciuses, infant Lyras, etc.—illustrate this. It is hence no mere poetic figure to say that the lamp of the mind lives upon and burns itself out. Yet there are numerous exceptions, such as Johnson, Mozart, Fergusson, Davy, where early genius grew into great and masculine powers. This rapid development in infancy or youth of faculties which are generally the result of protracted growth; and the intuitive acquisition of knowledge, which, under ordinary circumstances, is attained by laborious effort and cultivation, are most frequently witnessed in those of feeble and delicate constitution and of stunted frame. It is often seen as a concomitant of rickets, as in Pascal, Pope, etc.; and the dux of the school may often be pointed out from the disproportionate size of his head. While this development includes marvelous exercise of memory, of imagination, of constructive talent, of artistic genius, it rarely extends to judgment, reasoning, and sagacity. There appears to be evidence that this quality is not merely morbid, but that it exercises, reflexly, a detrimental influence upon healthy assimilation and growth, and arrests or retards that building up of the organization, upon which the ultimate capacity and usefulness of the individual depend. Education sometimes produces such prematurity, or fosters it where it has previously existed; so that the modern form of mental exhaustion, "the overworked brain," may be said to originate in the school-room. It is certainly illogical to employ this fact, as has been done, against infant schools; but it is incumbent to keep such a relation in view in all educational efforts; to avoid high pressure and stimulation, to adapt the kind of instruction to the age, and, so far as may be practicable, to the strength and tendencies of the pupils; and to combine systematic physical with all intellectual training.—Brigham, *Remarks on the Influence of Mental Cultivation and Mental Excitement upon Health;* Combe, *On the Management of Infancy;* Caldwell, *Thoughts on Physical Education*.

PRECOGNITION, a Scotch legal term, which denotes the heads or substance of the evidence which a witness in a criminal cause proposes to give at the trial. In all cases, before a trial, it is necessary for the solicitor to see the witnesses, and elicit from them the nature of the testimony they can give; and the heads of this testimony are called the precognitions, when written out. But the word has a technical meaning when applied to the examination of the witnesses before a justice of the peace or the judge-ordinary by the procurator-fiscal, previous to, and by way of enabling him to know how to frame, the charge. On such an occasion the witnesses are examined or precognosced, a proceeding which corresponds to the evidence given in England before a magistrate or justices of the peace, and called there the depositions.

PREDESTINATION, a theological word, used to denote the eternal decree of God, whereby "the elect" are foreordained to salvation. The correlative decree, whereby others are held to be foreordained to perdition (though it might with perfect correctness of language be included under the same term), is commonly distinguished by the other term, reprobation.

The theory of predestination had, like the doctrine of election (q.v.), its origin in the attempts of theological system to define the relations of the human and the divine will, and to reconcile the phenomena of human freedom with the belief in divine omnipotence. God's absolute will is represented by it as determining the eternal destiny of man, not according to the foreknown character of those whose fate is so determined, but according to God's own mere choice. They who are thus foreordained to eternal life are led to believe and live by the "irresistible grace" of the Holy Spirit. In human salvation, therefore, *God's* will is everything; *man's*, nothing. It was in the discussions between Pelagius and Augustine that the predestinarian view of the divine "decree" was first fully evolved; and since their time opinion in the church has run in two great currents—the one perpetuating the influence of Pelagius, who regarded that decree as subordinated to the divine foreknowledge of human character; the other, that of Augustine, who maintained the absolutism of that decree and its independence of all prior human conditions. Pelagius recognized a possibility of good in human nature; Augustine denied any such possibility, apart from the influences of divine grace. The one held that the choice of salvation lay in man's will; the other, that man's will had no active freedom or power of choice since the fall. In 529, the system of Augustine was established by the council of Arausio (Orange) as the rule of orthodoxy in the western church; but the reaction against the strictly logical, yet essentially *un*moral, nature of his dogma has been perpetually manifested by representatives of the more humane, though, perhaps, less logical doctrine of Pelagius, in every period of the church. In the days of the schoolmen, the discussions of the Scotists and Thomists—after the reformation, the contests leading to the condemnation of Arminius in the council of Dort, and the widening separation that now divides the disciples of Calvin from those theologians who hold broader and freer views on the subject of the *atonement*—indicate the impossibility of the human reason and conscience ever resting satisfied with a merely and absolutely logical theory of the relations between the will of God and the moral responsibility of man. The tendency of modern inquiry seems to be to abandon the discussion of a point so obviously incapable of being determined by human intelligence, and to pursue, instead, examination into the moral and practical bearing upon our human conditions of that which we are able to learn concerning God and his will. The moral meaning of that will is of vital moment to men; the extent of its power over their own wills they, apparently, cannot determine.

PREDICABLES. This is a term in the scholastic logic connected with the scheme of classification. There were five designations employed in classifying objects on a systematic plan—*genus, species, difference* (differentia), *property* (proprium), and *accident* (accidens). The first two—genus and species—name the higher and lower classes of the things classified; a genus comprehends several species. The other three designations—difference, property, accident—express the attributes that the classification turns upon. The difference is what distinguishes one species from the other species of the same genus; as, for example, the peculiarities wherein the cat differs from the tiger, lion, and other species of the genus *felis*. The property expresses a distinction that is not ultimate, but a consequence of some other peculiarity. Thus, "the use of tools" is a property of man, and not a difference, for it flows from other assignable attributes of his bodily and mental organization, or from the specific differences that characterize him. The accident is something not bound up with the nature of the species, but chancing to be present in it. For instance, the high value of gold is an accident; gold would still be gold though it were plenty and cheap.

It was by an arbitrary and confusing employment of the notion of predication that these various items of the first attempt at a process of systematic classification were called predicables, or attributes that might be "predicated," that is, affirmed of things. All that is needful to affirm is that a certain thing belongs to a given species or genus; and that to belong to the species is to possess the specific differences, and to belong to the genus is to possess the generic differences. We may also, if we please, *affirm* (or predicate) that the thing does belong to the species, or does possess the specific difference; but this power of affirming has no need to be formally proclaimed, or made the basis of the whole scheme.

The allied term "predicament" is another case where an abusive prominence is given to the idea of predication. The predicaments, or categories, were the most comprehensive classes of all existing things—under such heads as substance, attribute, quantity, quality, etc., and it could be predicated of anything falling under any one head that it does so fall under. Thus, "virtue" is an attribute, and therefore we might say that "attribute" can be *predicated* of "virtue." But the notion of predicating does not indicate the main fact of the process in this case, any more than "predicable" in the foregoing. *Classification*, and not predication, is the ruling idea in each.

PREDICATE. See PROPOSITION.

PRE-ESTABLISHED HARMONY. See LEIBNITZ.

PRE-EXISTENCE, DOCTRINE OF. The notion that human souls were in existence before the generation of the bodies with which they are united in this world was anciently, and is still, widely spread throughout the east. The Greek philosophers too, especially those who held the doctrine of transmigration (q.v.), as the Pythagoreans, Empedocles, and even Plato—if with him pre-existence is not simply a symbolical myth—were familiar with the conception. Among the early Christians, the assumption of such pre-existence was connected with the belief that God had created the souls of men before the world, and that these were united with human bodies at generation or at birth. Subsequently, the followers of this opinion were termed *pre-existencists*, to distinguish them from the *traducianists*, who held that children received soul as well as body from their parents. Direct intellectual interest in this doctrine has nearly altogether ceased in modern times, yet the dream—for whether true or false, it is and can be nothing but a dream in our present state, and with our present capabilities of knowledge—has again and again haunted individual thinkers. Wordsworth has given poetical expression to it in his famous ode—*Intimations of Immortality from Recollections of Early Childhood:*

> Our birth is but a sleep and a forgetting.
> The soul that rises with us—our life's star,
> Hath had elsewhere its setting,
> And cometh from afar,
> Not in entire forgetfulness,
> And not in utter nakedness,
> But trailing clouds of glory do we come
> From God, who is our home.

Nor must we overlook the fact, that the latest philosophy of Germany—that of the younger Fichte, has revived the doctrine; while it forms the basis of one of the deepest works in modern theology, that of Julius Müller, *Die Christliche Lehre von der Sünde* (The Christian Doctrine of Sin. English, Edin. 1856).

PREFECT, a common name applicable to various Roman functionaries. The most important was the *præfectus urbi*, or warden of the city, whose office existed at an early period of Roman history, but was revived under Augustus, with new and greatly altered and extended authority, including the whole powers necessary for the maintenance of peace and order in the city, and an extensive jurisdiction civil and criminal. The *præfectus prætorio* was the commander of the troops that guarded the emperor's person.

PRÉFET, the name of an important magistrate in modern France, so called from his exercising functions somewhat similar to those of the *præfectus urbi* at Rome. See PREFECT. In old times, the officers whose duty it was to superintend the details of administration in the provinces were called *maîtres des requêtes*. Under Henry II., their office was rendered permanent; and at a later period, their powers were much extended, and they were known by the designation of *intendants*. The intendants were abolished at the revolution; and a law of 1800 first appointed préfets for the departments, with powers greatly similar to those of the intendants. The office, as it now exists, includes the superintendence of the police establishment, the enforcement of the laws, and the entire control of the administration of the departments. The préfet is the head of the executive, exercises most of the government patronage, including the appointment of a *sous-préfet* for each *arrondissement*, and in time of tumult may call out the military, or provisionally declare a state of siege. The chief check on these extensive powers is to be found in the *conseil de la préfecture*, which acts in some measure as a court of appeal from the decisions of the préfet.

PREGEL, a river of Prussia, rises in the province of e. Prussia, where it is formed by the union of the Pissa and the Angerap near Insterburg. It flows almost due west past Welhau and Königsberg, and after a course of more than 90 m., enters the Frisches Haff, about 6 m. below the latter town. The Pregel is navigable even at Insterburg, and at Königsberg, is 720 ft. broad. Its principal tributaries are the Alle from the south, and the Inster from the north. The canal of Deine connects it with the Kurisches Haff.

PREGNANCY. See MIDWIFERY, *ante*.

PREGNANCY, CONCEALMENT OF, is a criminal offense, or rather it is taken to be the main proof of the offense of concealing the birth of a child in certain circumstances. It is only where the child is dead and has been secretly disposed of under suspicious circumstances, that the mother is punishable. Hence, the offense consists in endeavoring to conceal the birth, and, as part of such concealment, to conceal the pregnancy, the child having already died. If the woman failed to give publicity of her situation beforehand, it is presumed this was done from the improper motive, viz., to murder or destroy the child. To complete the offense, it is not necessary that the child should have been born alive; but if the child can be shown never to have lived, the prisoner must be acquitted. A usual test of concealment is, that the mother made no preparations for her delivery, nor provided child's clothes.

PREANITE, a mineral, composed chiefly of silica, alumina, and lime, the silica sometimes about 50 per cent of the whole; but with small and variable proportions of peroxide of iron, peroxide of manganese, potash, soda, and water. It is a widely diffused mineral, and although first discovered at the cape of Good Hope, has been found in great beauty in some places on the continent of Europe and in Scotland. Preanite exhibits a great variety of forms, with considerable variety of color; being found in crystals in fan-shaped and cockscomb-like groups, granular, reniform, fibrous, etc. It is colorless, or more generally greenish, and sometimes yellowish. See JADE.

PREL'ATE (Lat. *prælatus*, one set over), in church law, is the name given to the holders of those higher dignities in the church, to which, of their own right, is attached a proper jurisdiction, not derived by delegation from any superior official. In this sense, the name comprises not only prelates of the first class, as bishops, but also the heads of religious orders, abbots or priors of religious houses, and other similar ecclesiastical dignitaries. These, for the most part, are privileged to wear the insignia of the episcopal rank. In the Roman court, many of the officials, although not possessing episcopal or quasi-episcopal jurisdiction, have the insignia and the title of prelate. They are of two classes—the higher, called *del mantelletto* ("of the little mantle"), and the secondary, called *del mantellone* ("of the great mantle"), from the robe which they respectively bear.

PRE'LUDE (Lat. *præ*, before, and *ludo*, I play), in music, a short preface or introduction to a piece, intended to awaken the attention of the audience, generally smooth and flowing, and consisting of a short motivo which is kept throughout; or it may be composed of a succession of harmonies uninterrupted or connected by passages. It is in the same key with the piece which it is to introduce, and to which it is intended as a preparation.

PREMISES is a common legal term to signify a house or building, and the out-houses and places belonging to it, all of which are treated as one thing. It is also used to denote a certain part of an English deed, which is further subdivided into the form, date, parties, recitals, testatum, and parcels. The use of the word in this sense is derived from the subject-matter of a conveyance or deed being first stated or described in full, and afterward referred to collectively as the premises (Lat., *premissa*, things spoken of or rehearsed before).

PRE'MISE. See SYLLOGISM.

PREMONSTRATEN'SIAN (called also NORBERTINE) **ORDER**, a religious order, which at one time was among the most numerous and powerful of the monastic bodies of Germany, in which country its most important houses were established. It was founded in the early part of the 12th c. by St. Norbert, a native of Xanten, in the diocese of Cleves, of which church he was a canon. Struck by the prevailing irregularities and carelessness, not only of secular, but also of conventual life among the clergy and the monks, he resolved on attempting a reform of both, and obtained permission, in 1120, to found a cloister in the diocese of Laon, in France. The place selected by him was a spot in the forest of Coucy, pointed out, as he believed, in a vision, and thence called *Pré Montré*, or in Latin, *Pratum Monstratum*, "the indicated meadow," from which the name of the order was taken. In accordance with the double object which he sought to attain, Norbert organized his new order, which was substantially that of the canons regular of St. Augustine, as well with a view to the sanctification of the members, as to their usefulness in effecting the reformation of the age. Himself a man of remarkable piety and austerity of life, his rule is a return to the primitive fervor of the monastic institute; and the great work which he proposed for his brotherhood, in addition to the daily choral services of the church, was the practical instruction of the people, and the direction of consciences in the confessional. It was taken up with ardor, and spread rapidly in France and the Low Countries, and afterward—on Norbert's being chosen, in 1127, archbishop of Magdeburg—in Germany; the abbot of the mother-house at Coucy, however, retaining the rank of general and of superior of the entire order. It does not seem at any time to have made much progress, or at least to have established many houses, in Italy or Spain. In the same spirit of reformation, Norbert established an order of nuns, which attained to equal success. In the end of the 15th c., the Premonstratensian Order had no fewer than 1500 convents of men, and 500 of women, nearly all in France, Germany, and the northern kingdoms. A relaxation of the institute having taken place, in the progress of time there was a movement in the order, toward the close of the 16th c. (1573), similar to that which, in the Franciscan order (q.v.), led to the reform of the so-called conventual Franciscans; but the reformed communities in the Premonstratensian institute remained united with the older body; and in 1630 the reformed rule was accepted by all in common. The order, however, has gradually fallen in popularity. In France, its numbers had declined very much even before the revolution. Since that event, it may be said to have disappeared, except in Germany, where (in Austria) some magnificent, though thinly peopled houses of the order are still maintained.

PRENCE, THOMAS, 1601–73; b. England; came to Plymouth, Mass., in 1621 with the Leyden pilgrims, and settled at Eastham among the pioneers. He was governor 1634–38; re-elected 1657, serving till his death. His claim to the remembrance of posterity lies in his zeal for the religious and educational advancement of his fellow-colonists.

PRENTICE, GEORGE DENISON, 1802–70; b. Conn.; graduated at Brown university, 1823; studied law and was admitted to the bar in 1829, but did not practice. In 1830 he removed to Louisiana, having been editor of the Hartford *Weekly Review* for two years previous. From this time until his death he was the editor of the *Louisville Journal*, a whig newspaper, which throughout the war opposed the cause of secession with much vigor. He was a man of great personal courage, keen-witted, bitterly sarcastic, and of high political sagacity. He published many poems of some merit, a life of Henry Clay, 1831; and a collection of witty paragraphs from his paper, *Prenticeana*. His biography has been written by Mr. G. W. Griffin.

PRENTISS, a co. in n.e. Mississippi, drained by the Big Hatchie and Tombigbee rivers, both of which rise here, traversed by the Mobile and Ohio railroad; 350 sq.m.; pop. '80, 12,158—12,141 of American birth, 2,421 colored. Surface level and swampy; the magnolia tulip tree and black walnut abound; cotton, corn, and pork are the chief products. Co. seat, Booneville.

PRENTISS, Benjamin Mayberry, b. Va., 1819; removed to Missouri and Illinois, and engaged in business. He was a capt. of vols. in the Mexican war, and in 1861 was made col. of the 7th Illinois vols.; shortly afterward brig.gen. of 3 months' men, and placed in command at Cairo. He was first in command at the battle of Mount Zion, and won a decisive victory. In 1862 he left Missouri and joined Grant just before the battle of Shiloh, at which he was taken prisoner. In 1862 he was made a maj.gen., and in 1863 defeated Holmes and Price at Helena, Ark.

PRENTISS, George Lewis, D.D., b. Mass., 1816; graduated at Bowdoin college in 1835; was a teacher in the Gorham academy, 1836–37; studied theology at the universities of Halle and Berlin, 1839–41; became pastor of the South Trinitarian church (Congregational), New Bedford, Mass., in 1845, and of the Mercer street Presbyterian church in New York in 1851, which charge he resigned on account of ill health, and spent two years abroad. On his return he formed a new Presbyterian church on Murray Hill, New York (Church of the Covenant), and was installed its pastor in 1862. In 1873 he resigned this pastorate to accept the professorship of pastoral theology, church polity, and mission work in the Union theological seminary of New York. He has published *A Memoir of Sargant S. Prentiss*, 2 vols.; *A Discourse in Memory of Thomas Harvey Skinner, D.D., LL.D.*

PRENTISS, Sargant Smith, 1808–50; b. Me.; graduated at Bowdoin college, and was admitted to the Mississippi bar in 1829; removed to Vicksburg in 1832, and represented it in the state legislature in 1835. Elected to congress in 1838, he made a strong speech against the sub-treasury bill, but otherwise took little part in the proceedings of the house. He strenuously opposed the repudiation of the Mississippi state debt, and in part from his dislike to that measure removed to New Orleans in 1845.

PREN'ZLAU, or Prenzlow, a t. of Prussia, in the province of Brandenburg, stands on the northern shore of the lower lake Ucker, 71 m. n.n.e. of Berlin. It contains a mineral spring, several baths, and among its churches the beautiful Gothic *Marienkirche*, one of the most remarkable brick buildings in the country; date 1325–40. Pop. '75, 15,731, who carry on several manufactures, but are chiefly engaged in growing tobacco and corn, and in breeding and trading in cattle. Here, in Oct., 1806, a body of Prussian troops, 16,000 strong, under the prince of Hohenlohe, surrendered, after the defeat of Jena, to the French under Murat.

PREPOSITIONS are words that express certain relations between ideas—between the idea of an action and the idea of a thing, or between the idea of one thing and the idea of another thing. "The river runs *to* the sea. The glass stands *on* the table. The dog lies *under* the table. He runs *round* me. She runs *from* me. The house *by* the wood. The house *in* the wood." In all the instances just given, the relation is of one kind—that of place or direction. And this was the original signification of all prepositions. they gradually, however, came to express other relations. Thus: "That depends *on* you. Subjects are *under* the sovereign. She got *round* her father. Vice springs *from* idleness. Wood is consumed *by* fire. Your enemy is *in* your power." The transition from the palpable, physical relation to the more abstruse mental relation, is, in most cases, obvious.

A preposition is distinguished from an adverb by its always requiring an object (a noun or pronoun) after it. In the sentence, "He runs *about*," *about* is an adverb describing the mode of running; in "He runs *about* the house," it is a preposition referring the direction of the running to a particular object.

Many relations are expressed by *prepositional phrases;* as, *instead of*, *with regard to*, *apart from*. The preposition *beside* is evidently an abbreviation of such a phrase—*by the side of*. This tendency in phrases to become simple prepositions, is manifest in other cases. Instead of the full expression, "on this side of the river," we often hear, "this side the river," where *this-side* has the force of a preposition, and may yet come to be written *thisside*.

Of the relations expressed in the modern forms of the Aryan tongues by prepositions, a great many were formerly expressed by cases. See Declension, Inflection, Philology.

Along with prepositions are classed certain particles, which, although they may not stand by themselves and govern a case, are yet used in composition with verbs in the same way as the prepositions proper; as in *out*run, *re*place.

The simple prepositions (Eng. *in*, Dan. *i*, Lat. *in*, Gr. *en;* Eng. *on*, Gr. and Goth. *ana*, Ger. *an*, Slav. *na;* Eng. *of*, Goth. *af*, O. H. Ger. *aba* or *apa*, Ger. *ab*, Sans. *apa*, Gr. *upo*, Lat. *a*, *ab;* Eng. *by* [be], Goth. *bi*, Ger. *bei*, Gr. *epi*, Sans. *abhi;* etc.) belong to the primary or radical words of language. They are often identical with the pronominal roots (see PRONOUNS), and along with them form a class of roots whose primary signification is position or relation in space. All attempts, like those of Tooke, to make them derivatives from verbs, are futile. On the contrary, verbs and other parts of speech are often derived from prepositions, as *utter* from *out; open* and *upper* from *up*. Some prepositions have a derivative form, as *after* (from the root of *of*), Lat. *inter* (*in*); others are compounded of two prepositions, or a preposition and prepositional particle, as *upon*. *but* (i.e., by out, or be out), *before*, *within*, *into*. Other prepositions, again, contain a noun, as *against* (A. S. *ongegen*, or *tó gegnes;* where, from the forms in the allied languages, the element *gegen* is clearly a substantive, the primary meaning of which, however, has not been made out); *among* (A. S. *gemang* or *ongemang*, *gemang* meaning primarily mixture); *between* (i.e., by or be, two or twain). Such prepositions as *during*, *except*, were originally participles used absolutely; thus, "during the war" = the war during or lasting, i.e., while the war dured or lasted; "except this" = this excepted (*hoc excepto*).

The study of the etymological relations of prepositions is instructive, as showing how near to one another often lie the most opposed meanings. They are, as it were, the opposite poles of one and the same conception—correlatives depending on a common ground relation, and are thus naturally expressed by words that are radically the same. Thus, Eng. *up* corresponds to Goth. *uf*, Sans. *upa*, Gr. *hypo*, Lat. *sub*. The meaning of *up* is motion from below to above, leaving, however, the idea of the upper terminus the more prominent; *uf*, *hypo*, *sub*, on the contrary, are used to express *under;* but that the notion of upward motion lurked in these roots, is clear from such Latin compounds as *suspicio*, to look up at a thing; *sustineo*, to hold up; and it only required a slight modification—a kind of comparison—to convert them into *ufar*, *hyper*, *super*, meaning "above"—a result which the English attains by adding the preposition *on* (upon). The same principle is copiously exemplified in the numerous forms and derivatives of the prepositional toot FR, in Sans., Gr., Lat., and Sl., PR, in which motion or removal from the speaker in the front direction seems to be the ground idea. For example, when, in reference to any epoch, we speak of the events that have *pre*ceded and those that are *pre*dicted as to come, the same particle *pre* points in two opposite directions.

PREROG'ATIVE COURT, in England, was the court wherein all wills were proved and administrations taken out. It was so called because it belonged to the prerogative of the archbishop to take charge of these matters, which formerly fell under ecclesiastical superintendence. Hence there was a prerogative court for the province of Canterbury, and another for the province of York. This jurisdiction was entirely taken away in 1858 from the ecclesiastics, and transferred to a new court called the probate court (q.v.).

PRESBURG, a co. in n.w. Hungary, bounded by Neutra, Komorn, Wieselburg, and lower Austria; 1664 sq.m., pop. '70, 297,377. It is intersected by the Vienna, Presburg, and Pesth railway, connecting its capital with Vienna. It is drained by the Danube river navigable by steamboats; and is traversed by the Carpathian mountains. Near the city of Presburg is the island of Schutt in the Danube. Its soil is clayey and sandy in certain localities, and very fertile except in marshy sections and near the mountains, on which the snow lies as late as June, but where fruit is often raised, and an abundance and variety of wines are produced. Timber is plentiful, growing in forests of oak, beech, lime, birch, maple, and pine. The arable portions produce corn, wheat, tobacco, hemp, potatoes, and millet. Chestnuts, lemons, oranges, plums, and cherries grow. Live stock is raised, horses of a small growth, and cattle peculiar to the country, of a grayish-white color, with large spreading horns. Marble is the chief mineral product, and the mineral springs are celebrated for their medicinal virtues. The principal city next to the capital is Tyrnau, a manufacturing town with a considerable trade. Its leading industries are the manufacture of woolens, silks, tobacco, snuff, oil, roseglio, and leather, and it has a considerable trade in corn, linen, and wine. Capital, Presburg.

PRES'BURG (Lat. *Posonium;* Magyar, *Pozsony;* Slav. *Pressburek*), a t. in the extreme w. of Hungary, close upon the frontier of lower Austria, is built on the left or northern bank of the Danube, 41 m. by railway e. of Vienna. The neighboring hills are clothed with vineyards. It was long the principal city of Hungary, having been made the capital in 1541, when the Turks seized possession of Buda; and even as late as the last quarter of the 18th c. it was the most beautiful and the most populous town in the kingdom; but when Joseph II., in 1784, restored to Buda its ancient dignity of being the capital of Hungary, and the scene of the coronation of its kings, the sources of the prosperity of Presburg began to be dried up. Its population in 1869 was 46,544, of whom more than two-thirds were Roman Catholics, about 10,000 Lutherans, and 7,000 Jews. Fully one-half of the inhabitants are German, and German is the prevalent language. The most notable buidings in the town are the (Gothic) cathedral, in which the kings of Hungary were crowned; the royal palace, a vast square structure overlooking the town, accidentally burned in 1811, and not since repaired; the Capuchin, Franciscan, and Ursuline monasteries, with beautiful churches attached to them; the land-haus (hall of the Hungarian diet), etc. The transit-trade by steamboat and railway, especially in corn, is very great, and gives considerable animation to an otherwise quiet place. Presburg carries on manufactures of silks, woolens, leather, paper, tobacco, glass, and chemical products. Outside the town lies the "king's hill" (*Königshügel*), to which the sovereigns of Hungary were wont to ride after their coronation, and brandish their sword toward the four quarters of the heavens, signifying by that symbolic act that they would defend Hungary from danger—come whence it might. A treaty was concluded here between Napoleon and the Austrian emperor—known as the "treaty of Presburg"—Dec. 27, 1805, in virtue of which Austria ceded Venice to France, and the Tyrol to Bavaria. Presburg gives name to a "county."

PRESBYTER, PRESBYTERIANISM. Presbyter (Gr. *presbyteros*, elder) is the title of an office or dignity in the Jewish synagogue, and also of one of the grades in the Christian hierarchy. In the latter sense the title has been the occasion of a protracted controversy as to the respective claims of the bishop (q.v.) and the presbyter, which, except historically, would be out of place in these pages. The word presbyter not unfrequently occurs in the Epistles and the Acts of the Apostles, and in more than one of these passages it is certainly applied to persons whose office would seem to be in all respects the same as that which is claimed for the "bishop" in the Episcopalian theory. From this identity of name the identity of office has been inferred, and it has been hence concluded that the distinction of bishops and presbyters is a human and post-apostolic ordinance. Advocates of the Episcopal theory admit that the name presbyter is occasionally given, both in Scripture and in the early church writers, to persons who bore the office of bishop (*episcopos*), and that the latter certainly was in all cases a presbyter; but they contend that besides being a presbyter, he was also something more and something higher, That the office of Timothy, for example, was superior to that of a presbyter is conceived to be plain from St. Paul's instruction to him (1st Timothy v. 19) as to how he should receive testimony against a presbyter. The same is inferred from Titus i. 5. On the other hand no example, it is affirmed, appears of a presbyter sitting in judgment on a bishop, or "appointing bishops in every city." But Presbyterians do not admit the validity of these arguments, inasmuch as they assert the identity of presbyter and bishop, and the right of co-presbyters both to judge a brother and also to ordain the office of the ministry. Episcopalians rely still more, however, on the apostolic fathers, and those of the 3d and 4th centuries. Among the fathers of the former period, Clement of Rome, and even more plainly, Ignatius of Antioch, point to the bishop's superiority as already established, and they are followed by Tertullian, Irenæus, Clement of Alexandria, and Cyprian. On the Presbyterian side a remarkable passage is quoted from Jerome, in which, while repressing the pretensions of deacons to equality with presbyters, he appears to place the presbyter on the same level with the bishop in all the functions of the ministry except the power of ordination. The explanation of this passage, according to the Episcopalian view, is found in what has been already indicated by the community of name which existed even in the primitive times; while they also rely on the difference implied in the very important exception which even Jerome admits, in this very passage—viz., the power of ordaining. The offices of presbyter and bishop, according to the Roman Catholic theory, both, although in different degrees, belong to what Roman Catholics regard as the priesthood of the new law. This priesthood the bishops possesses in its fullness, the presbyter only in part, but the functions which belong to that part are discharged alike by the presbyter and the bishop, although by the former only in subordination to the latter. What these functions are will be detailed under the head priest (q.v.); but the principle of a certain distinction of functions, and the limitation of the power of the presbyter as to one at least—that of ordination—is expressly recognized by Jerome in the passage alluded to. The name presbyter has been retained even in the Roman Catholic theory of a priesthood; but although, by the opponents of the Episcopalian doctrine, the word is used with the express design of excluding the sacerdotal idea, it has come, in the popular language of Roman Catholic theology, to be identical with priest. From an early period, however, a distinction of rank among the presbyters came into use. Several being, in some cases, attached to a single church, one of the number received the title of *proto-presbyter* or *archi-presbyter;* but it is quite certain this office bore no analogy to that of the bishop.

In all existing Presbyterian churches a primary element is the representation of congregations in presbyteries, etc., by their delegated elders, of whom the "minister," or preaching elder, is always one; and this system of representation is advocated partly on the general ground of the unity of the church, and partly on the special ground of the example of the church in the apostolic age (Acts xv.). The affairs of particular congregations are managed by a court, styled in Scotland the kirk-session, consisting of the minister, or ministers, if there are more than one, and the other elders, the minister or one of the ministers presiding, but each member having equal power and vote. From the decisions of this court an appeal lies to the presbytery, which is usually constituted of the ministers of a certain number of his congregations and one "ruling elder" from each congregation. Further appeals may be taken to *synods* and *general assemblies*, in churches so large that for convenience the presbyteries of a district are grouped into a "provincial synod," and all the provincial synods are subordinated to a general assembly; but in respect of this there are considerable diversities, and the "supreme" church court, whether *synod* or *general assembly*, is variously constituted by direct representation of each congregation, of each presbytery, or of each provincial synod. Nor are diversities of this kind regarded as in the least degree affecting the principle of Presbyterianism.

Presbyterian churches generally recognize an order of *deacons* (q. v.) as existing in the church, with power only over its secular affairs; but in many Presbyterian churches this office is merged in that of the elder, and all its functions are exercised by the members of the kirk-session. A tendency to revive the distinct office of deacon, has, however, been recently manifested in some of the Presbyterian churches.

Some Presbyterians maintain the *divine right of presbytery*, as the one system of church government authorized by the word of God; others only maintain that Presbyterianism is *consistent* with the word of God; whilst many Presbyterians maintain that the Presbyterian system, whatever its imperfections as existing anywhere, is, of all systems that have ever existed in the church, the most agreeable to the principles of church government which may be deduced from Scripture.

Presbyterianism, variously modified, is the form of church government subsisting in many Protestant churches, but is more perfectly developed in Britain and America. In Britain it prevails chiefly in Scotland, although on the revolution in the 17th c. it was for a very short time in the ascendant in England also. The *consistorial* system of the continent of Europe (see CONSISTORY), cannot, in any of its modifications, be regarded as essentially Presbyterian, although in some respects it approaches to Presbyterianism. The French consistorial system is more nearly Presbyterian than the German, and is not perfectly so only from the pressure of the civil power. In other churches, also, as well as in the Protestant church of France, Presbyterianism is more or less modified by the relations of the church to the state.

PRESBYTERIAN CHURCH IN UNITED STATES. The first Presbyterians in America were emigrants from Scotland and Ireland. The first Presbyterian congregations in America were organized in Maryland before the close of the 17th c.—the oldest, that of Rehoboth, dating about 1690; and the first presbytery in Philadelphia in 1705. A synod, consisting of four presbyteries, was constituted in 1716. Dissensions ensued; but in 1758 the American Presbyterian churches were united in one; and in 1788 a general assembly was instituted, the whole number of congregations being then 419, and of ministers 188. The increase of the church was rapid, and in 1834 it contained 22 synods, 111 presbyteries, and about 1900 ministers. In 1801 a scheme of union was adopted between Presbyterians and Congregationalists, under which hundreds of congregations were formed in the state of New York and elsewhere. About the beginning of the present century the Cumberland Presbyterians (q.v.) separated from the main body; and in 1838 the American Presbyterian church was divided into two great sections, commonly known as *old school* and *new school* Presbyterians; the former holding high Calvinistic doctrines; the latter, a somewhat modified Calvinism. Both of these churches are extended over the whole of the Untred States, and both of them have missions in different parts of the heathen world, their collections for missions forming a large part of the contributions for that object from the United States of America. For some years they showed symptoms of a sincere desire to reunite; and this object they accomplished in 1869, notwithstanding the dissensions and new divisions caused by the struggles between the northern and southern states on the question of slavery. At the time of this union the old school Presbyterians counted 2,381 ministers, 2,740 churches, and 258,903 communicants; while the new school numbered 1848 ministers, 1631 churches, and 17,562 communicants. The former possessed at the same time the following theological seminaries: "Princeton," "the Western," "Union," "Danville," and "Chicago;" and the latter owned the "Union," "Auburn," "Lane," "Blackburn," and "Lind." Besides the Cumberland Presbyterians there are other minor branches of the Presbyterian church in America, connected with different denominations in Scotland.

PRESBYTERIAN CHURCH IN THE UNITED STATES (*ante*) was founded by Scotch, Irish, Huguenot, Dutch, and German reformed emigrants with a few from New England. Persecution in Europe forced many to seek new homes in the colonies of Maryland, New Jersey, Pennsylvania, Virginia, and Carolina. One of the first Presbyterian ministers was Francis Makemie, from Ireland, and the earliest churches planted by him were at Rehoboth, on the eastern shore of Maryland and other places in the same colony. Other churches founded at nearly the same time were the "Scotch meeting-house at Freehold, N. J., 1692; the first Presbyterian church at Philadelphia, 1698; and Drawyer's church, Delaware, before 1700. The presbytery of Philadelphia was organized a little later than 1700; the precise date having been written only on the first page of the records, which has been lost. It consisted of seven ministers—Samuel Davis, John Hampton, Francis Makemie, and George McNish, from Ireland; Nathaniel Taylor and John Wilson from Scotland; and Jedediah Andrews from New England. In 1716 the synod of Philadelphia was formed, consisting of four presbyteries: Philadelphia, with six ministers and churches; New Castle, six ministers and churches; Snow Hill, three ministers and churches; and Long Island, two ministers and churches. The act by which the Westminster confession and catechisms were adopted as the standards of the church was passed in 1729, after much excited discussion between the recently arrived Irish ministers and those who had been in this country a longer time. The former desired the very words of the Westminster standards; the others were displeased with even the general terms of the adopting act, which was intended for a compromise, but did not fully accomplish its design. The differences of opinion continued to manifest themselves, and at length resulted in an American branch of the associate Presbyterian church. In 1739 the visit of Whitefield and the revivals attending his work, aroused a new party feeling in the church, dividing the synod into the warm friends of the revivals and those who were opposed to, at least, some aspects of the work. In 1741 the synod was rent in twain: the old side, who insisted on a thoroughly educated ministry, remained in the synod of Philadelphia; and the new side, who attached chief importance to piety and zeal, constituted the synod of New York. There was little difference between the two bodies as to either doctrine or discipline. Gilbert Tennant, the warm friend of Whitefield, was the leader of the new side. After 13 years the breach was healed, the two synods uniting in 1758, under the name of the synod of New York and Philadelphia. At this time population was flowing rapidly to the west, having on its frontier line persons of very diverse characters and aims. Some were lawless men, seeking opportunity to live as they pleased, some loved the excitement of frontier life; some sought chiefly to improve their temporal condition by obtaining cheap homes on new lands. All were poor; they were exposed to hostile Indians; and to these obstacles the Presbyterian evangelist in some regions found state opposition superadded. Only men of education, energy, and zeal could have overcome such hindrances. Such were many of the first Presbyterian ministers: the Tennants of New Jersey; David and John Brainerd of the Indian mission, and Davies of Virginia.

In 1766 the synod agreed to meet in annual convention with the general association (Congregational) of Connecticut, to unite their endeavors and counsels for spreading the gospel and preserving the religious liberties of the churches. This plan was adhered to until the revolution suspended all intercourse. At the revolution the Presbyterians were united and zealous patriots, and in common with others suffered greatly. Many of their church buildings were destroyed; others were occupied as hospitals and barracks; and many of their congregations were disbanded. Yet the vitality of the church continued, and on the return of peace increased interest was manifested in all religious affairs. In 1785 a large committee of eminent men was appointed to form from the constitution of the Scottish and other Protestant churches a system for the Presbyterian church in the United States. In May, 1788, the synod resolved itself into a general assembly, the first meeting of which was held the following year. It embraced four synods: New York and New Jersey, Philadelphia, Virginia, and the Carolinas. These contained 17 presbyteries, 419 congregations, and 180 ministers. The assembly adopted the Westminster confession of faith with a few slight alterations; the catechisms, with one alteration; and modified the form of government and discipline of the church of Scotland so as to disclaim the right of the civil magistrate to interfere in church affairs except for protection alone. After the war the friendly relations with Congregationalists were at once renewed. In 1792 the general assembly and the general association of Connecticut agreed that each denomination should be represented in the annual meeting of the other by three commissioners; and the agreement was afterward extended to the general associations of Massachusetts, New Hampshire, and Vermont. In 1794 these commissioners were allowed to vote on all matters under discussion. In 1801 a plan of union was adopted by both denominations under which a Congregational church might have a Presbyterian pastor, still retaining his place in his presbytery, and might be represented therein by its delegate instead of a ruling elder; and a Presbyterian church represented in its presbytery by a ruling elder might have a Congregational pastor still continuing a member of his association. By the operation of this "plan of union," during 36 years hundreds of Congregational churches became Presbyterian, modified by sending a "committee-man" to the presbytery; and in many cases the committee-men grew naturally into genuine and excellent ruling elders.

At the opening of the present century the revivals that prevailed in various sections of the church were of special interest in the s.w., having in many cases singular physical accompaniments—and led incidentally, in 1811, to the formation of the presbytery of Cumberland. See CUMBERLAND PRESBYTERIANS. In 1822 the synod of the associate Reformed church, under the lead of Dr. John M. Mason, united with the Presbyterian church; a considerable minority, however, refusing to acquiesce in the vote of the majority, retained their separate organization. During the following years the denomination increased very rapidly. New churches and presbyteries were multiplied in the middle and western states. In 1834 there were 22 synods, 111 presbyteries, and about 1900 ministers. In 1837–38 the division of the church into the old-school and new-school branches occurred. See NEW-SCHOOL and OLD SCHOOL PRESBYTERIANS. It continued until Nov., 1869, when terms of re-union, entirely equal and fraternal, were mutually adopted, and declared to be of binding force, at an adjourned meeting of both general assemblies, at Pittsburg, Penn. In 1870 the first reunited general assembly, composed of commissioners chosen by all the presbyteries of both branches, met in Philadelphia, and reconstructed the church by consolidating the 51 synods into 33, and directing them to meet at specified times and places in order to reconstruct the presbyteries within their bounds. These meetings were duly held, and the 259 presbyteries consolidated into 167.

The administration of the benevolent work of the reunited church was intrusted to the boards of foreign missions, home missions, and church erection, to be located in New York city; the boards of publication, ministerial relief, and education, in Philadelphia; the committee on freedmen, to which was added in 1871 the committee on sustentation, at Pittsburg, Penn. The theological seminaries were brought under one general plan, according to which, while their boards of directors have the general charge of them, including the election of professors, they report annually to the general assembly, which has a veto power on professors newly elected, to be exercised, if at all, immediately after the election has been reported. Arrangements were commenced for celebrating the reunion by a general memorial fund, to be appropriated to any objects tending to establish the churches and extend their work at home and abroad. The amount thus contributed, as reported at the general assembly of 1871, was about $10,000,000 additional to the regular contributions to the boards.

For the commencement and progress of the foreign missionary work of the Presbyterian church see FOREIGN MISSIONS. Its home missionary work began with its own existence. In 1707 the first presbytery resolved that every minister of the presbytery supply neighboring destitute places, where a minister is wanted, and opportunity of doing good offers. As the presbyteries and synods increased they greatly extended the work. In 1802 the assembly appointed a standing committee of missions to which the presbyteries were to report; in 1816 this committee was enlarged into a board having full power to transact all the business of the missionary cause, and to report annually to the assembly. From 1802–16 over 300 domestic missionaries were sent out, at a cost of $50,000; from 1816–38, 2,500 were sent out, at a cost of $230,000; from 1838–70, the old school branch alone sent out 16,000, at a cost of $2,800,000. Before the division, and for some time after it, the new-school branch carried on its home-mission work through the American home missionary society. In 1852 their assembly appointed a church-extension committee, and, in 1862, gave their whole work of home missions to the charge of the Presbyterian committee on home missions. From 1838–69 it is estimated that they sent out 8,800 home missionaries. After the reunion both agencies were united into one board.

The American Presbyterian church has from the beginning diligently prosecuted the work of education. In 1739 a school was established by the synod of Philadelphia. In 1747 the college of New Jersey was established by influential men in the synod of New York. Among the numerous colleges and universities since founded by Presbyterians are: Washington and Jefferson, 1802; Hamilton, 1815; Maryville, Tenn., 1819; Centre, Ky., 1823; Hanover, Ind., 1827; Lafayette, 1831; Wabash, 1832; Lincoln, Penn., 1853; University, Cal., 1859; Blackburn, Ill., 1867; King, Tenn., 1857; Wooster, Ohio, 1870; Evans, Col., 1874; Parsons, Iowa, 1875. The theological seminaries are: Princeton, N. J., 1812; Auburn, N. Y., 1820; Western, at Allegheny, Penn., 1837; Lane, Ohio, 1832; Union, New York, 1836; Danville, Ky., 1853; Northwest, Chicago, Ill., 1859; Blackburn, Ill., 1867; San Francisco, Cal., 1871; German, Bloomfield, N. J., 1869; German, Dubuque, Iowa; Lincoln university (theological department); and Biddle memorial institute, Charlotte, N. C. (theological department). According to the reports made to the assembly, 1880, there are in connection with this branch of the church: 38 synods, 177 presbyteries, 5,338 ministers and licentiates, 5,489 churches, 578,671 communicants, 631,952 members of Sunday-schools, and the total amount of contributions in the preceding year was $8,361,028.

PRESBYTERIAN CHURCH OF THE UNITED STATES (SOUTH), organized, Dec. 4, 1861, by commissioners from all the presbyteries within what were then called the Confederate states, who met at Augusta, Ga., and constituted the general assembly. The title chosen was the Presbyterian church of the Confederate States of America; but after the suppression of the rebellion, *United* was substituted for *Confederate*, and *of America* was dropped. At that time this church contained 12 synods, 62 presbyteries, 1821 churches, 1079 ministers, and 112,183 communicants. Its contributions amounted to $1,138,681. Its standards, substantially the same as before its separate organization, have been amended in some minor particulars to suit the circumstances and views of southern Presbyterians. It claims to be even stricter than before in its views concerning the standards and the divine authority of church government; and more zealous than ever in maintaining special and protracted religious services. Southern Presbyterians have always held a high standard of ministerial and general education. They have been prominent in the work of founding and maintaining colleges and schools. During the war many of these institutions perished by the loss of their endowments in the general wreck. Among these were Oglethorpe university, Ga., Oakland college, Miss., La Grange college, Tenn., and others less prominent. Some were suspended by the enlistment of their students in the armies, and some suffered a partial loss of endowments. Many, having survived the disasters of the war, are now growing in strength and usefulness. Among this class are: Hampden-Sidney, Va., Davidson college, N. C., Westminster college, Mo., King college, Tenn., and Austin college, Texas. Central university, Richmond, Ky., has been founded since the war. Six of the synods have together projected the South-western university, to be located at Clarksville, Tenn., for which they are now gathering an endowment. Many academies of established character were, like the colleges, broken up by the war. Some however remain; among them are: Bingham school, Mebanesville, N. C., Pleasant Ridge academy, Ala., Edgar institute, Paris, Ky., military and classical institute, Danville, Ky., Finlay high school, Lenoir, N. C., and Kemper institute, Booneville, Mo. There are 2 theological seminaries—Union, at Hampden-Sidney, Va., and Columbia, at Columbia, S. C.—these are endowed and furnished with buildings, libraries, and 4 professors each. The benevolent operations of the church are conducted by the general assembly through the executive committee of foreign missions and sustentation, of publication, and of education.

Foreign missions have been established in the Indian territory, Mexico, South America, Greece, Italy, India, and China. At the date of last report, number of missionaries: 26 ordained ministers, 25 licentiates and assistant missionaries from the United States, with 9 ordained native ministers, and 25 native assistant missionaries, making altogether 85. These missions have under their care 22 churches, containing 1200 members, and 13 schools containing 250 pupils. The sustentation branch of the committee distributed $20,000 to aid in the support of 185 churches in 57 presbyteries, $6,000 for evangelistic labor, and $10,000 to relieve disabled ministers and the families of ministers deceased. A house is established at Richmond, Va., with a capital of $40,000 for publishing books for the libraries of ministers, congregations, and Sunday-schools.

The *Southern Presbyterian Review*, established more than 30 years ago, and now published under the supervision of the professors in the two theological seminaries, is conducted with learning and ability. Considering the calamities which have fallen on this portion of the Presbyterian church since its organization, its success has been remarkable; but considering the vast extent of territory over which it is diffused, and the destitution of a large part of it, the work yet to be done is very great, and the means for doing it very small. According to the reports made to the assembly, 1879, there were in connection with this branch of the church: 12 synods, 66 presbyteries, 1122 ministers and licentiates, 1892 churches, 116,755 communicants, 70,224 children in Sunday-schools, and the total amount of contributions was $1,015,851.

PRESBYTERIAN CHURCH IN ENGLAND. The principles of the Puritans (q.v.) were essentially Presbyterian, although many of them were so much occupied with questions of doctrine and discipline, and with resistance to power exercised, as they believed, contrary to the word of God, that they paid little heed to the development of their principles in church government. Yet, in 1572, a presbytery was formed at Wandsworth, in Surrey, by ministers of London and its neighborhood, separating from the church of England; and other presbyteries were soon formed, notwithstanding the extreme hostility of queen Elizabeth. When the Westminster assembly met in 1643, the Puritans of England were generally inclined to adopt Presbyterianism as their system of church goverment, although some still preferred a modified episcopacy, and some had adopted the principles of independency or Congregationalism. The Presbyterians were, however, the strongest party in the beginning of the revolution, although the Independents gained the ascendency afterward. The establishment of Presbyterian church government in the church of England was voted by parliament (the long parliament), Oct. 13, 1647; but it was never really established. The influence of the Independents prevented it. London and its neighborhood were, meanwhile, formed into 12 presbyteries, constituting the provincial synod of London, which continued to hold regular half-yearly meetings till 1655, the meetings of presbyteries being continued till a later date; but the whole Presbyterian system was overturned by Cromwell's committee of triers, appointed for the examining and approving of all persons elected or nominated to any ecclesiastical office. Cromwell's policy aimed at bringing all ecclesiastical matters under the immediate control of the civil power. The restoration was followed by the fruitless Savoy conference (q.v.), and soon after by the act of uniformity, which came into force on Aug. 24, 1662; and on that day, about 2,000 ministers in England and Wales resigned their benefices, or submitted to be ejected from them, for conscience' sake. The first Nonconformists (q.v.) were mostly Presbyterians, but a small minority of Independents among them prevented the institution of a regular Presbyterian system, and the consequence was that the Nonconformists of England became in general practically, independent. Antinomianism and Arminianism soon appeared among them, and were followed by Socinianism or Unitarianism to such an extent, that the name *Presbyterian* became synonymous in England with *Socinian* or *Unitarian;* old endowments, legacies of Presbyterians, being in many instances enjoyed by Unitarians. Meanwhile, there existed in England a few congregations connected with the church of Scotland, and with what was formerly known as the "Secession church," now the United Presbyterian church. The number of such afterward very much increased. At the time of the formation of the Free church of Scotland (q.v.), the greater number of the English Presbyterian churches connected with the church of Scotland sympathized with the cause of the Free church, and took the name of the Presbyterian church in England. In 1876 a union, which had been long desired, was consummated between the synod more intimately related to the Free church of Scotland and the congregations belonging to the United Presbyterian church. The name assumed by the united church is the Presbyterian church of England. At the time of the union, the Presbyterian church in England had about 150 churches, and the United

Presbyterian church more than 100. At the same date, the church of Scotland in England had about 20 congregations.

PRESBYTERIAN CHURCH IN IRELAND. The Irish Presbyterian church originated in the settlement of Ulster by Scottish colonists during the reign of James I. After various struggles, a Presbyterian church was founded by the formation of a presbytery at Carrickfergus in 1642. The Presbyterian population of Ulster was greatly increased in number by immigration from Scotland about the middle of the 17th c.; and notwithstanding many difficulties, from the opposition of prelates and of the civil power, the church continued to increase. It is a curious fact that the Presbyterian ministers received a pension from government, under Charles II., in 1672, which *regium donum* (q.v.), however, was not regularly paid until the reign of William, when it was augmented, although only to the paltry amount in all of £1200 a year. It was afterward repeatedly augmented, till it reached the amount of £70 for each minister. A seminary for the education of ministers was erected at Killaleagh; and in 1710, the synod of the Presbyterian church resolved to institute the preaching of the gospel to the Irish in their own language. During this period of its history, the Irish Presbyterian church, experienced the utmost opposition from the *high church* party. Afterward, dissensions sprung up within it, and these with reference to the most important doctrines. A body opposed to the doctrine of the Westminster confession of faith was organized as the presbytery of Antrim. But the doctrine of the Westminster confession was more and more departed from in the Irish Presbyterian church itself, which became to a large extent Arian or Unitarian. In 1830, a separation took place from the Arians, who then formed the *remonstrant synod of Ulster*. In 1840, a union took place of the Irish Presbyterian church forming the *synod of Ulster*, and the *secession church in Ireland*, an offshoot of the Scottish Secession church, which then reckoned 141 congregations in the n. of Ireland. The Irish Presbyterian church now consists of about 600 congregations, and has not only displayed much zeal for the advancement of Protestantism in Ireland, but also of Christianity in other parts of the world, and supports a very successful mission in Guzerat The act disestablishing the Irish church in 1869, provided also for the discontinuance of the *regium donum* to the Presbyterians, with reservation of annuities for life to ministers already entitled to it; and further gave power for commutation of annuities for a capital sum, of which advantage has been taken to a very large extent, so that a fund has been formed for paying annuities and leaving a large surplus as the nucleus of a sustentation fund for the ministers in time to come. The liberality of the members of the church has at the same time been called forth to a greater degree than before.

PRES'BYTERY, the space in the choir of a church in which the high altar is placed; the name is sometimes extended to the whole choir.

PRESBYTERY, in Scotch law, is an ecclesiastical division of the country, as well as a court. In its local sense, it includes a combination of parishes, varying from 4 to 30, and the general assembly of the church of Scotland has power to vary the size. See SCOTLAND, CHURCH OF.

PRESCOT, a manufacturing and market t. of Lancashire, 8 m. e. of Liverpool. At Huyton, 1½ m. distant, there is a station on the London and North-western railway. Prescot has long been well-known for its manufactures of watch-tools, watch-movements, small files, etc. Potteries are in operation in the vicinity. The pop. in '71 was 5,990.

PRESCOTT, a co. in n.e. Ontario, having the Ottan river for n. and n.w boundary separating it from Quebec; 500 sq.m.; pop. '71, 17,647. It is drained in the w. portion by the Petite Nation river. Russell co. holds its courts at the same court-house in its co. seat, L'Original.

PRESCOTT, a t. in e. Canada, division of Ontario, a port of entry on the n. bank of the river St. Lawrence; pop. '71, 2,617. It is connected with Ogdensburg, across the river by a ferry. It is on the Grand Trunk railway, at the terminus of the St. Lawrence and Ottawa railroad, connecting it with the city of Ottawa; 114 m. from Montreal, 220 m. from Toronto, and 47 from Ottawa. In the vicinity is the British fort of Wellington. It has a branch bank, 4 churches, and a weekly newspaper. Its manufactories consist principally of iron foundries, breweries, distilleries, and railroad repair shops, and it has a brisk local trade.

PRESCOTT, OLIVER, 1731–1804; b. Mass.; graduated at Harvard college in 1750; practiced medicine at Groton; was before the revolution maj., lieut.col., and col., in the militia, and in 1776 appointed brig.gen. for the co. of Middlesex, and was a member of the board of war; in 1777 was elected a member of the supreme executive council of state, serving three years; in 1779 was made judge of probate for the county of Middlesex; was surgeon of the expedition against Shay's rebellion. In 1780 he was elected a member of the academy of arts and sciences. He published a *Dissertation on the Natural History and Medical Effects of the Secale Cornutum or Argot*, and contributed to the *New England Journal of Medicine and Surgery*.

PRESCOTT, RICHARD, 1725–88; b. England; served in Germany during the seven years' war. He was in Canada in 1773, and surrendered Nov. 17, 1775, on the reduction of Montreal by the Americans; having been attacked while attempting to convey troops and stores to Quebec. In the following September he was exchanged for gen. Sullivan. He was commandant at Newport, until captured by lieut.col. Barton; and on being exchanged for gen. Lee, resumed command in Rhode Island;. remaining in that position until the evacuation of Newport, Oct. 25, 1779. In 1777 he was made maj.gen. and lieut.gen. Nov. 26, 1782.

PRESCOTT, Robert, 1725–1816; b. Lancashire, Eng.; was made capt. 15th foot, Jan. 22, 1755, accompanying them against Rochefort 1757 and Louisburg 1758. He acted as aid-de-camp to Amherst in 1759, and afterward served under Wolfe. He participated in all engagements in the revolution from the battle of Brooklyn, through those in Westchester co., to the storming of fort Washington, and the expedition against Philadelphia in 1777. He was brevetted col. Aug. 29, and fought in the battle of Brandywine. He went in the expedition against the West Indies under gen. Grant in 1778. He was made lieut.gen. 1793; was made gov. of Barbadoes and Guadeloupe after the capitulation of Mar. 22, 1794; and in 1796 became gov. of Lower Canada. Gen. in the army Jan. 1, 1798.

PRESCOTT, William, 1726–95; b. Mass.; served in 1755 as lieut. and capt. in the provincial army under Winslow in an expedition against Nova Scotia. Afterward he became a farmer in Pepperell on a large estate which he had inherited. Hearing of the battle of Lexington, he formed a regiment of minute men, and marched as its col. to Cambridge With a brigade of 1000 men he threw up intrenchments at Bunker hill, displaying great bravery, and being the last to leave the field. He served two years longer, and was a volunteer at Saratoga in 1777. Returning home he was in the state legislature for several years.

PRESCOTT, William, 1762–1844; graduated at Harvard college in 1783; studied law at Beverly with Nathan Dane, and practiced there two years; removed to Salem in 1789; represented the town several years in the legislature, and afterward was elected by the federal party state senator; removed to Boston in 1808, and for several years was a member of the governor's council. In 1814 he was a delegate to the Hartford convention; in 1818 appointed judge of the court of common pleas; in 1820 was a delegate to the state constitutional convention. He was a member of the American academy of arts and sciences.

PRESCOTT, William Hickling, ll.d., American historian, son of a distinguished lawyer and statesman, and grandson of col. William Prescott, an officer of the revolution, was b. at Salem, Mass., on May 4, 1796. He entered Harvard college in 1811, and graduated in 1814. During his college course, he had one eye blinded by a piece of bread playfully thrown by a fellow-student, and his studies so affected the other that he was sent abroad for his health, and traveled in England, France, and Italy. On his return to America he married, and abandoned the study of law for literature. In 1819, he determined to devote 10 years to study, and the succeeding 10 to composition. He contributed, however, several papers to the *North American Review*, collected in his Miscellanies. In 1825 he was engaged in the study of Spanish literature, and selected materials for his *History of Ferdinand and Isabella*. While engaged in this work, his sight failed, and, with the aid of a reader who knew no Spanish, he went through the seven quarto volumes of Mariana's history. After 10 years of painful labor his work was made ready for the press, and a few copies struck off for his friends, whose warm approval secured its publication in 1837 (3 vols. 8vo, Boston and London). It met with immediate success, and was translated into French, Spanish, and German. He next devoted six years to the *History of the Conquest of Mexico* (3 vols., 1843, London and New York); and four years to the *Conquest of Peru* (2 vols., 1847). These careful, elaborate, and charmingly written works made for him a high reputation. He was chosen corresponding member of the French institute; and, on his visit to Europe in 1850, he was received with the highest distinction. In 1855, he published two volumes of his *History of Philip II.*, and a third volume in 1858, but left it unfinished. He died at Boston, Jan. 28, 1859. Mr. Prescott was an elegant scholar and writer, a man of a cheerful humor and affectionate character, methodical in his habits, and persevering in his pursuits. He walked five m. regularly every day, composing as he walked. He devoted five hours to literary labor, two hours to novel-reading, for the refreshment of his mind—Scott, Dickens, Dumas, and Sue being his favorite authors. He gave one-tenth of his ample income in charity, and divided his time between his winter mansion in Boston, a summer residence at Nahant, and a farm-house where he spent the autumn. In his large library, with the light carefully regulated for his imperfect vision, he wrote with a stylus each day what he had composed, which was then copied, read over, and carefully corrected. His life, by George Ticknor, was published in 1864.

PRESCRIPTION is the term applied to the written direction or receipt given by the physician or surgeon to the chemist for the preparation of a medicinal substance suitable to a special case. In prescribing, the medical practitioner may either order an *officinal* or an *extemporaneous* compound. Officinal compounds (or preparations, as they are frequently termed) are those for which formulæ are introduced into the national pharmacopœias, and are therefore supposed to be always at hand in the laboratory of the dispensing chemist (such, for example, as *mistura ferri composita*, *pulvis ipecacuanhæ* *compositus, confectio aromatica,* etc.); while extemporaneous compounds are those which are devised on the instant with the view of meeting the various peculiarities which almost every case of disease presents. "Too much importance," as Dr. Paris very truly observes, "cannot be assigned to the art that thus enables the physician to adapt and graduate a powerful remedy to each particular case by a prompt and accurate prescription. If he prescribes upon truly scientific principles, he will rarely, in the course of his practice, compose two formulæ that shall *in every respect* be perfectly similar, for the plain reason, that he will never meet with two cases exactly alike."—*Pharmacologia,* 9th ed., 1843, p. 374.

The author whom we have just quoted, and who is the highest English authority on the subject, lays down *five objects* which the physician should have in view in the construction of an extemporaneous formula or prescription. They are: 1. To promote the action of the principal medicine (or, as he terms it, the basis) of a formula. 2. To correct the operation of the basis. 3. To obtain the joint operation of two or more medicines which act in totally different ways. 4. To obtain a new and active remedy not afforded by any single substance. 5. To select an eligible form.

The *first object* may be attained (*a*) by combining different preparations of the same substance, as, for example, tincture of senna with infusion of senna in the ordinary black draught; or (*b*) by combining different substances of a similar action, as, for example, opium with hyoscyamus or conium; or sulphate of magnesia with the preparations of senna; or quinine with the preparations of iron. The *second object* may be attained in various ways. For example, the addition of extract of hyoscyamus to the compound extract of colocynth renders the purgative action of the latter much less griping, but not less efficacious; the addition of dilute sulphuric acid to a solution of sulphate of magnesia renders that purgative salt less liable to gripe, and makes it sit easier on the stomach; and extract of eleterium, if given in hot brandy and water, acts equally powerfully as a hydragogue cathartic without causing the depression of the vital powers, which it often occasions if given alone. As an illustration of a mode of attaining the *third object,* we may refer to the operation of purgatives and of diuretics. If we administer a purgative which acts mainly in increasing the peristaltic motion of the intestines, their contents will be urged forward and evacuated, but the operation will be slow and difficult, and probably be accompanied with griping; but if we combine this medicine with one which acts by increasing the flow of fluids into the intestine, the purgative action will be increased and quickened, and all griping will be avoided. A combination of foxglove, squill, and blue pill or calomel will act much more powerfully as a diuretic than any one of the substances taken alone; and they probably all act in different ways on the system. The *fourth object* is usually attained by chemical decomposition. The activity of the *Mistura Ferri Composita* is due to the carbonate of iron which it contains, and which is yielded by the double decomposition of the two ingredients of the mixture, sulphate of iron and carbonate of potash. By prescribing a mixture of solution of iodide of potassium and corrosive sublimate, we obtain an extemporaneous formation of biniodide of mercury. The black wash (see LINIMENTS) owes its active ingredient to the decomposition of calomel by lime-water. In some cases, where no chemical action is apparent or probable, a mixture of two or more drugs seems to modify the physiological effect of each ingredient. For example, Dover's powder contains as its active ingredients ipecacuanha and opium, and yet in well-regulated doses it neither exhibits the nauseating properties of the former nor the narcotic influence of the latter substance. The *fifth object,* the selection of the most eligible form of the remedy, is of extreme importance. The physician here has to determine whether he shall prescribe his remedy in the form of pill, powder, or mixture; whether he shall administer it as an injection into the lower bowel; whether the patient shall (in certain cases) inhale it; etc. As a general rule, we should accommodate the form and flavor of our remedies, provided we do not sacrifice their virtues to the taste of the patient, who usually prefers pills to draughts or powders. The unpleasant taste of many medicines which must be given in the fluid form may often be obviated by the skill of the prescriber. Castor oil, cod-liver oil, and copaiba are most easily taken on the surface of orange wine, or water containing a bitter tincture, care being taken to moisten with water the edge or rim of the glass at the part applied to the mouth. The taste of solution of potash and of lime-water is best covered with milk; and the disagreeable flavor of senna is said to be concealed if its infusion is made with strong tea.

In conclusion it may be remarked that in this country it is the custom to write prescriptions in the Latin language, to abbreviate well-known words, to use symbols for weights and measures, and to commence each prescription with the symbol ℞, which signifies *Recipe,* take. As an illustration, we append a prescription for a tonic draught:

(*Name of Patient.*)

℞	Infus. Calumbæ,	*f.* ʒ ix
	Tinct. Calumbæ,	*f.* ʒ i
	Acid. Sulph. Dilut.,	♏x
	Syrup. Aurant.,	*f.* ʒ iss

M. *Fiat Haustus ter qoutidie sumendus.*

Date (*in Latin*).

(***Initials or name of prescriber.***)

PRESCRIPTION, in law, is the limit of time within which one may acquire certain legal rights, by reason of the want of vindication by some other person of such rights, and putting in force his legal remedies. In England, however, it has a limited meaning, confined to a certain class of rights relating to lands, such as rights of way, of water-course, of fishing, shooting, etc.; while in Scotland it is a general term, applicable to all legal rights and to real property; and hence prescription in Scotland corresponds to prescription *plus* limitation (q.v.) in England. Prescription in England is thus a mode of acquiring a legal right, incident to land, by the mere force of claiming and exercising it, without dispute, for a certain length of time. Thus, if a neighboring owner has for 30 years, without interruption, actually enjoyed a right of common, such as pasture, fishery, shooting, etc., over another's lands, he will be entitled to it as a legal right forever after, unless in certain exceptional cases; and if he has enjoyed it for 60 years, his title forever after cannot be defeated. So, if a person has for 20 years enjoyed, without interruption, a right of way, or of water-course, or of watering cattle, and similar easements (q.v.) on another's lands, he will be entitled, forever thereafter, to enjoy these, except in a few exceptional cases; and if the enjoyment has been for 40 years, he is entitled in all circumstances. So, if a person whose house adjoins another's lands, and whose windows open upon such land, has enjoyed the light coming to these windows for 20 years, he can forever thereafter prevent his neighbor from building on his land, and thereby darkening such lights. In Scotland prescription includes such rights as have been already mentioned, and also the other substantive rights of property. With respect to servitudes, such as right of way, water-course, fuel, feal, and divot, the right can be gained by the enjoyment for 40 years. Prescription is divided into positive and negative. By the positive prescription whenever one enjoys lands for 40 years, and can show an infeftment, or a series of infeftments, during such time, though no previous title at the commencement of such period, such person obtains a right to the property. This enactment applies to all kinds of heritable subjects, including leases and servitudes, which require no infeftment, and as to which mere possession for 40 years, without interruption, will give the right. By the negative prescription of 40 years, rights are cut off, unless sued for within that period as a debt due on a heritable bond, and on all contracts whatever. Servitudes are also lost by the lapse of 40 years without enjoyment. Besides these prescriptions there are others, called the lesser prescriptions. Thus, there is a 20 years' or vicennial prescription, applicable to certain written contracts; a 10 years' or decennial prescription, applicable to actions against tutors and curators; a 7 years' or septennial prescription, applicable to actions against cautioners; a sexennial or 6 years' prescription, applicable to actions on bills of exchange; a quinquennial or 5 years' prescription, applicable to actions for arrears of rent and verbal contracts; a 3 years' or triennial prescription, applicable to actions on ordinary merchants' accounts, for servants' wages, rent due on a verbal lease, and for work done by workmen, attorneys, etc. With regard to crimes, also, in Scotland but not in England, a 20 years' prescription applies, and no prosecution is competent after that period.

PRESCRIPTION (*ante*), in law, follows in the United States in most points the requirements of the English law. The chief difference is in regard to the length of time during which there must have been adverse possession. This in almost all the states is fixed at 20 years. The uses and enjoyment of the easement or other incorporeal hereditament must be adverse, exclusive, uninterrupted, and continuous; and there must be some person not under disability to resist such use in possession or occupation. When the title is once acquired, it is absolute.

PRESENTATION, the name of the act by which a patron of a living in the established church of Scotland appointed a minister; so called because the presentee had to be presented to the presbytery for inquiry into his qualifications, and for induction, if these were satisfactory. If the patron failed to present within six months, the right then devolved on the presbytery. When a presentee was objected to by the major part of the congregation, whether with or without reason, the general assembly of the church formerly claimed the right to declare that he should not be inducted or entitled to the benefice. This declaration was contained in an act of assembly, dated 1835, called the veto act. But after much litigation, it was decided by the courts of law that such veto act was *ultra vires* and void; and this decision led to a secession of many ministers and people from the established church, and to the formation of a new dissenting church, called the Free church (q.v.). It was then settled by law that it was the presbytery, not the congregation, who were to consider all objections to the presentee, mere dislike on the part of the people not being a ground of rejection. In 1874, however, an act of parliament was passed by which patronage was abolished, and the right of choosing their minister transferred to the congregation. See PATRONAGE.

PRESENTATION, ORDER OF. See SISTERHOODS.

PRESENTMENT is, in English law, the formal representation made by a grand jury of the finding of an indictment; by church-wardens to the ordinary of the state of the parish; by the court of quarter sessions of the fact of the disrepair of a bridge, etc. Presentment, with reference to bills of exchange, is the formal demand made by the creditor to the debtor, who is primarily liable, calling upon him to accept the bill or to pay it. If the bill is not paid, then notice of dishonor must be sent to the other parties secondarily liable, who are then bound. See BILLS OF EXCHANGE.

PRESERVATION OF WOOD. See WOOD PRESERVING, *ante.*

PRESERVES—PRESERVED PROVISIONS, etc. Much variety is comprehended under these terms: the first is generally understood to mean fruits preserved with sugar or brandy; and the latter, such articles of animal or vegetable food as are used ordinarily, but which are preserved by any means for the convenience of carriage, and for use beyond the time they would remain uninjured by ordinary keeping. Fruits intended for confectionery are preserved in four different ways: First, They may be preserved in the form of jam, in which the fruit is simply boiled with from one-half to equal its weight of sugar. By this method, the fruit becomes broken, and the juice set free; but all is preserved, as the latter forms a thick syrup with sugar. Such preserves can be kept, if well made, for several years, but are best used during the first winter. A second plan is to preserve only the juice, which, when carefully strained from the solid portions of the fruit, and boiled with a third or half its weight of refined sugar, constitutes the fruit-jellies of the cooks and confectioners. Another method is called candying, and consists in taking fruits whole or in pieces, and boiling them in a clear syrup previously prepared. In this way they absorb the syrup, and are then dried by a gentle heat, which causes the sugar of the syrup to crystallize on the surface and through the substance of the preserved fruits, which retain their form, and much if not all of their color. The remaining method is to carefully stew them in a weak syrup of refined sugar and water, so that they are rendered soft but are not broken. They are then transferred, with the syrup, to jars with well-prepared covers, to prevent evaporation; and pale brandy, equal in quantity to the syrup, is added. As a rule, only stone-fruits, such as peaches, plums, and cherries, are preserved in this way. Several fruits and vegetables, such as olives, cucumbers, cabbage, etc., are preserved for food in a saturated solution of salt and water poured in hot; others, in vinegar, See PICKLES.

But the most approved methods of preserving vegetable and animal substances for food purposes, so as to be used as nearly as possible as if they were in the fresh state, is either to desiccate them or to seal them in air-tight cases. The first method was introduced by M. Chollet of Paris in 1852, and patented in England in 1854. It was, and still is, chiefly applied to vegetables, and a few kinds of fruit, such as apples and pears, which have a small amount of juice. By this method, M. Chollet entirely removes all moisture from the vegetables, by drying either in a vacuum or by the aid of heated air, which reduces their bulk more than one-half. They are then compressed under powerful presses, which, beside rendering them extremely portable, also makes them less liable to absorb moisture from the atmosphere, which is very desirable, as they are very absorbent. In this way, both the color and distinctive flavor of the vegetables are completely preserved, and mere soaking in water restores them almost precisely to their original condition. The introduction of this process has been of great benefit to voyagers, as it enables ships to carry a complete supply of vegetable provisions on the longest voyage.

The method of sealing cooked provisions in air-tight metallic cases, which is now so largely in use, is of comparatively recent invention, and has only been brought into use during the present century. In 1810 Augustus de Heine took out a patent in this country for preserving food in tin or other metal cases, by simply exhausting the air by means of an air-pump; but it was unsuccessful. It was followed by a number of others by various persons, all of which were more or less failures, until Wertheimer's patents, which were three in number, from 1839 to 1841. By his plan, the provisions of whatever kind are put into the metal cases, and closely packed, and the interstices filled in with water or other appropriate liquid, such as gravy in the case of flesh food. The lids are then soldered on very securely; two small perforations are made in each lid, and the cases are set in a water-bath, in which muriate of lime is dissolved, and heat is applied until the whole boils, and the air is expelled through the small openings in the lids of the cases When this is complete, the small holes are quickly soldered up, and the tins are removed from the bath. The muriate of lime is used because its solution can easily be maintained at a heat of 270° to 280° F., without material evaporation. Other plans have been patented similar in principle, but varying in the mode of applying it. A large business of this kind has for several years been successfully carried on by John Gillon & Co., Leith, and by Moir, Aberdeen, whose cases of preserved meats and soups are well known as an article of commerce. The imports of tinned meat from Australia and New Zealand are now extensive, and are yearly increasing. A very ingenious and scientific plan for preserving meat fresh was invented by prof. George Hamilton of Cheshire. It consists in cutting the meat small, and putting it into jars of binoxide of nitrogen, which perfectly preserves its sweetness and ordinary appearance. This plan has been tried with success on a small scale, and was shown in the Paris exhibition of 1855 as a French discovery, although prof. Hamilton's paper was in Paris in 1854. The fresh meat of late so largely imported from America may be said to be preserved, as it is kept fresh—*not* frozen—by being packed in chambers cooled by the presence of large quantities of ice. In addition, we have to notice here some recent efforts to preserve animal food. As yet the most successful method is by placing it when boiled in tins of convenient size for household consumption, hermetically sealed from the air. The waste of animal food in Australia and America had long been a cause of regret, and the sending of it to Europe in a dried state was only partially attempted, when the plan of preserving it in a boiled condition was first tried. on any scale, in 1866 or 1867. Since then, the quantity of Australian and American mutton and beef from Australia and the United States consumed in Great Britain has increased very rapidly. In 1872 the total value of the imports of unsalted meat was not far short of a million sterling. In 1877 the value of the imports of meat, salted and fresh, was over three millions sterling. Of this a value of £1,204,000 was for beef, fresh or slightly salted, from the United States.

The eminent chemist Liebig suggested the manufacture of a concentrated extract of meat; and this is now carried on very extensively both at home and abroad. It is chiefly used by invalids, and for quickly making soups. Only the lean or muscular part is used, and this is boiled until all but the fibrin is dissolved out; the liquid is then concentrated until it is brought to the state of a thick paste, in which state it is easily preserved. Much controversy has of late taken place concerning the nourishing properties, not only of Liebig's, but of all meat extracts. Still those physiologists who have least to say in their favor do not deny that they have some useful properties as food, and their use is decidedly on the increase. The Liebig extract of meat company is said to have slaughtered, in the year 1872, 150,000 head of cattle.

A few years ago, prof. Redwood patented a method of preserving fresh meat by a coating of paraffin; but this substance, from its brittleness, is apt to crack, and we are not aware that it is now in use. Signor Mariotti has patented a rather peculiar plan, which consists in carbonizing the whole surface of the meat by taking advantage of the high temperature of boiling fat into which it is dipped. No way of preserving animal food fresh, however, excels the simple one of storing it in chambers or cabins at a temperature as little as possible above the freezing-point. By this method large supplies of fresh meat have been conveyed to this country from the United States and Canada in steamers fitted up for that purpose. The value of the beef alone thus imported amounted in 1877 to £1,686,392.

Two large companies, an English and a Swiss, have been lately formed for the supply of condensed milk, and also coffee and cocoa mixed with it and sugar, in such a way as to be ready for use with the addition of boiling water. Coffee so prepared is at present very much in demand.

PRE'SES OF MEETING, a name given in Scotland to the chairman of a meeting, who is often popularly believed to have some mysterious power or authority; but in point of fact, he has no more power than any other person present, and is merely, for convenience, used as a mouthpiece for putting questions and amendments to ascertain the will of the majority. In meetings of creditors under the bankrupt act, a preses requires to be elected before any business is done; but his power is confined to that of constituting the meeting, and preserving order, so far as the creditors mutually agree to obey his suggestions. As a general rule, a preses, or chairman, has only a single vote, like other persons, and not a casting vote, unless where some act of parliament expressly gives it to him, according to the nature of the meeting held.

PRESHO, a co. in s. Dakota, having the Missouri river on the n. and n.e., and White river for its s. boundary; 1600 sq.m.; formed since the census of '70, still unorganized. Its surface consists of rolling prairies drained by Medicine creek in the n., and adapted to stock-raising and farming.

PRESIDENT OF THE UNITED STATES, the chief executive officer of the United States of North America. The second executive officer is the vice-president, who succeeds to the office of president in case of the removal of the president from office, or of his death, resignation, or inability. The president holds his office during a term of four years, beginning on the 4th day of March next succeeding the day of his election. No person except a native of the United States is eligible to this office. A candidate must be not under 35 years of age, and is chosen by electors who have been chosen by the people. The president receives for his services a compensation of $50,000 a year, and the constitution forbids his receiving during office any other emolument from the United States or any state. He is commander-in-chief of the army and navy of the United States, and of the militia of the several states when called into the actual service of the United States. He may require the opinion, in writing, of the principal officer in each of the executive departments upon any subject relating to the duties of their respective offices, and he has power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment. He also has the power, by and with the advice and consent of the senate, to make treaties, appoint ambassadors, other public ministers and consuls, judges of the supreme court, and all other officers of the United States whose appointments are not otherwise provided for. It is the duty of the president to send to congress, from time to time, a "message" giving information of the state of the union, and recommending to their consideration such measures as he shall judge necessary and expedient. He may, on extraordinary occasions, convene both houses or either of them, and, in case of disagreement between them with respect to the time of adjournment, he may adjourn them to such time as he shall think proper. He receives ambassadors and other public ministers; commissions all the officers of the United States; and must take care that the laws are faithfully executed. He can be removed from office on impeachment for and conviction of treason, bribery, or other high crimes and misdemeanors. Every bill which passes congress must have the president's signature to become a law, unless, after he has returned it to congress with his objections, two-thirds of each house shall vote in its favor. For the election of a president, each state is entitled to a number of electors equal to its number of senators and representatives in congress, who meet at their respective state capitals on the first Wednesday in January after their election, and transmit their votes to the president of the U. S. senate. The votes are canvassed by the two houses of congress in joint convention, and the result is declared on the second Wednesday in February following the meeting of the electors. Formerly the constitution provided that the person receiving the second highest number of votes for president became vice-president, but the twelfth amendment makes provisions for a separate election of the vice-president. The following list gives the names of those who have held the office of president: George Washington, 1789-97; John Adams, 1797-1801; Thomas Jefferson, 1801-9; James Madison, 1809-17; James Monroe, 1817-25; John Quincy Adams, 1825-29; Andrew Jackson, 1829-37; Martin Van Buren, 1837-41; William Henry Harrison, Mar. 4, 1841-April 4, 1841; John Tyler (succeeded to the office as vice-president), 1841-45; James Knox Polk, 1845-49; Zachary Taylor, 1849 to July 5, 1850; Millard Fillmore (succeeded to the office as vice-president), 1850-53; Franklin Pierce, 1853-57; James Buchanan, 1857-61; Abraham Lincoln, 1861-April 15, 1865; Andrew Johnson (succeeded to the office as vice-president), 1865-69; Ulysses S. Grant, 1869-77; Rutherford B. Hayes, 1877-81; James A. Garfield, 1881. The presidents chosen for a second term of office were Washington, Jefferson, Madison, Monroe, Jackson, Lincoln, and Grant.

PRESI'DIO, a co. in s.w. Texas, bounded on the s. by the Rio Grande, and on the e. by the Pecos river; about 15,000 sq.m.; pop. '80, 2,817—1288 of American birth. The surface is even. The soil is sterile except about the streams, and suitable only for grazing. Co. seat, Fort Davis.

PRESQUE ISLE, a co. in the s. peninsula of Michigan, on lake Huron; about 650 sq.m.; pop. '80, 3,113—1450 of American birth. Capital, Rogers City.

PRESS, FREEDOM OF THE, the expression used to denote the absence of any authorized official restraint on publication. The press is an instrument well adapted for disturbing the functions of government, and committing injuries against reputation; and when its power as a political engine was first discovered, the European governments took it into their own hands, no one being allowed to print any work till it had obtained the sanction of the proper authorities. The clergy also, on behalf of the papal hierarchy, claimed a share in the censorship, where questions of religion were concerned. In England, at the reformation, the control of the press came to be more completely centered in the crown than elsewhere, the ecclesiastical in addition to the secular department being vested in Henry VIII. as temporal head of the church. The company of stationers, who came to have the sole right to print, were servants of the government, subject to the control of the star-chamber. The censorship of the press was enforced by the long parliament, and was re-established more rigorously at the restoration. It was continued at the revolution, and the statute regulating it was renewed from time to time till 1693, when the commons, by a special vote, struck it out of the list of temporary acts to be continued. Since that time, the censorship of the press has ceased to exist in Britain. But though there are no official restrictions on what shall and what shall not be published, the authors and publishers of criminal or injurious matter are amenable to the law of libel; and there are certain statutory requirements in force to enable them to be traced. The existing statutes which apply to all printed publications are 39 Geo. III. c. 79, amended by 51 Geo. III. c. 65, 2 and 3 Vict. c. 12, and 32 and 33 Vict. c. 24. Every person who prints anything for hire or reward must, under a penalty of £20, keep one copy at least of the matter printed, and write on it the name and place of abode of the person who employed him to print it. By statute 2 and 3 Vict. c. 12, every person who shall print any paper meant to be published, must print, on the first or last leaf, his name and usual place of business; and on failure to do so, he forfeits the sum of £5, and so does any person publishing the same. There are a few printed papers exempted from conforming to the above requirement—as for instance papers printed by parliament or in government offices, engravings, auction lists, bank notes, bills of lading, receipts for money, and a few other similar matters. In the case of a libel, legal publication is constituted by the sending of a copy printed or in manuscript to a man, and the sale of a newspaper or other publication in a shop, or its delivery to an officer at the stamp-office, is also considered an act of publication. The truth of the statements published may be urged as a plea of defense in an action for libel, but only on the ground of its publication being calculated to promote the public interest. See LIBEL. The existing statutes affecting newspapers are 2 Geo. IV. and 1 Will. IV. c. 73, 6 and 7 Will. IV. c. 76, and 32 and 33 Vict. c. 24. If a bill shall be filed in any court for the discovery of the name of the printer, publisher, or proprietor of a newspaper or other publication, with the view of rendering him liable in damages for slanderous matter, the defendant is bound to make the discovery required, which, however, cannot be made use of against him in any other proceeding than that for which it has been made. The penalties against newspapers can only be sued for in the name of the attorney-general or solicitor-general, or lord advocate. Certain regulations also exist regarding the exhibition of plays, for which see Laws as to Theaters. Subject to these restrictions, the freedom of the press has subsisted in Britain since 1693.

A more or less rigorous censorship of the press exists in most European states. There is often no direct supervision previous to publication, but the official censor has it in his power to stop any publication which he deems objectionable, to confiscate the edition, and to prosecute the author and editor. Newspapers and pamphlets are generally subjected to a stricter censorship than larger works.

PRESS, THE. See Printers; Printing: also Journalism; Newspaper.

PRESSENSÉ, Edmond Déhoult de, d.d., b. in Paris, 1824; student of theology at Lausanne, Halle, and Berlin, and in the latter place a friend of Neander; a Protestant preacher of great warmth and vigor of style, and in his writings an energetic opponent of the government church establishment. He was elected deputy from the department of the Seine in 1871, and marked his stay in the assembly by eloquent advocacy of amnesty to the national guards who had joined the commune, of moderation in legislation concerning the "international" organization, of free education, and by a warm support of the republic. Among his works are: *Conférences sur le Christianisme dans son Application aux Questions Sociales*, 1849; *Du Catholicisme en France* 1851; *Histoire des Trois Prémiers Siècles de l'Église Crétienne*, 1858; *L'Ecole Critique et Jésu-Christ*, 1863, which is apropros of Rénan's life of Jesus; *La Liberté Religieuse en Europe dépuis*, 1870; etc. He was founder of the *Revue Crétienne*, and the *Bulletin Théologique*. His wife is a well-known authoress.

PRESSING TO DEATH. See Peine Forte et Dure.

PRESSIROS'TRES, a tribe of birds of the order *grallatores*, distinguished by a bill of moderate size, not so strong as in the *cultrirostres;* whilst the hind toe is either wanting, or so short as not to touch the ground. To this tribe belong bustards, plovers, lapwings, oyster-catchers, etc.

PRESSTIS'SIMO (Ital. very quick) is the most rapid degree of movement known in musical composition.

PRESTER JOHN. See John, Prester.

PRESTO (Ital. quick), in music, a direction that a piece should be performed in a rapid lively manner.

PRESTON, a co. in n. West Virginia, adjoining Pennsylvania; drained by Cheat river; on the Baltimore and Ohio railroad; about 595 sq.m.; pop. '80, 19,040—18,369 of American birth, 208 colored. The surface is uneven, traversed by mountain ridges, and heavily timbered. The soil in the valleys is fertile. The principal productions are corn, oats, and live stock. Bituminous coal is found. Co. seat, Kingswood.

PRESTON, an important manufacturing and market t., a municipal and parliamentary borough in Lancashire, on the n. bank of the Ribble, and at the head of the estuary of that river, 27 m. n.n.e. of Liverpool. It occupies an eminence 120 ft. above the Ribble, and it covers an area 2 m. square. The houses are mostly built of brick, and the town is on the whole well laid out, and is surrounded with pleasing scenery. The river is crossed by two bridges and several railway viaducts. There are 14 churches, 7 Catholic and 20 other dissenting chapels. The chief public buildings are the town-hall, of Gothic design, which contains the guild-hall and exchange, and was erected at a cost of upward of £60,000; the Preston and county of Lancaster royal infirmary, erected 1869; the corn exchange and market-house; the house of correction and court-house; the institution for the diffusion of useful knowledge, with a library of 10,000 volumes; the institute and school for the blind. It has also several public libraries; 4 weekly and 2 semi-weekly newspapers. Linen manufactures were formerly the staple, and though still extensive, have been supplanted by the cotton manufacture, which now holds the first place. Preston contains in all about 90 cotton-mills, which give employment to about 27,500 hands. There are also iron and brass foundries, iron ship-building yards, carriage-works, and machine shops; and malting, brewing, and rope-making are also carried on. Preston is a free port, and is reached at spring-tides by vessels drawing 14 feet. In 1872, 816 vessels of 42,695 tons entered and cleared the port. Its imports are chiefly corn, iron, and timber; its exports principally coal. Four great fairs are held here during the year, besides the usual weekly markets. The celebrated guild of merchants, called Preston guild, is still observed here every 20 years. On the last occasion, 1862, the foundation stone of the new town-hall was laid. It is about 700 years since the guild merchant of Preston was acknowledged by royal charter. The first of its 14 royal charters was granted in the reign of Henry II. Preston alone has kept up the celebration of its guild to the present day. The borough returns two members to the house of commons. Pop. '71, 85,427.

PRESTON, John S., b. Va.; 1809; educated at Hampden-Sidney college, and the university of Virginia. He studied law at the Harvard law school, and was admitted to the bar. Marrying a daughter of gen. Wade Hampton, he settled in South Carolina, where he was active in the nullification movement. He had large sugar plantations in Louisiana, but retained his residence in South Carolina, in whose legislature he served, 1848-56. In 1860 he headed the delegation of his state to the democratic convention at

Charleston, but withdrew. He was prominent in the secession movement, and a commissioner from South Carolina to Virginia.

PRESTON, MARGARET (JUNKIN), b. about 1835; resides in Lexington, Va.; daughter of George Junkin, president of Washington college, Va.; married col. J. T. L. Preston, professor in the Virginia military institute. In 1855 she published an admirable translation of the *Dies Iræ;* 1856, *Silverwood, a Book of Memories;* 1866, *Beechenbrook, a Rhyme of the War:* 1869, *The Young Ruler's Question;* and is author of several short poems.

PRESTON, THOMAS SCOTT, b. Conn., 1824; graduated at Trinity college, Hartford, in 1843, and at the general theological seminary in New York in 1846; was assistant rector of the church of the Annunciation, and, later, of St. Luke's in New York. In 1849 he went to St. Joseph's theological seminary, Fordham, and was ordained in the Roman Catholic church in 1850; was assistant at the cathedral in New York and pastor of St. Mary's church at Yonkers, N. Y.; appointed in 1853 chancellor of the diocese of New York; in 1873 vicar-general. He has also been pastor of St. Ann's church since 1861. His published works are: *Ark of the Covenant, or Life of the Blessed Virgin; Life of St. Mary Magdalene; Life of St. Vincent de Paul; Sermons for the Seasons of the Sacred Year; The Purgatorian Manual; Lectures on Christian Unity; Reason and Revelation; Christ and the Church; The Vicar of Christ.*

PRESTON, WILLIAM CAMPBELL, LL.D., 1794–1860; b. Philadelphia; graduated from the South Carolina university in 1812, studied law under Wirt, the noted lawyer and author, and in Edinburgh, Scotland. In 1820 he was admitted to the bar and began practice in Columbia, S. C.; was very successful; in 1824 was sent to congress, and was afterward a member of the state legislature. He was an extreme advocate of free trade, state rights, and nullification. He served as U. S. senator 1836–42, and was prominent in debate.

PRESTONPANS, a village of Haddingtonshire, having a station on the North British railway, 8½ m. e. of Edinburgh. It is supposed to have had salt-pans as early as the 12th c., and possessed thriving manufactures till some time after the reformation. Its present manufacturing industry is limited to that of ale. Pop. '71, 2,064. Near Prestonpans was fought the famous battle of that name, in which the Jacobites under prince Charles Edward completely routed the royal army under sir John Cope, capturing their cannon, baggage, and military chest.

PRESTWICH, a cotton manufacturing village, and township of Lancashire, 4 m. n.w. from Manchester. It has a fine old Gothic church, built in the 13th c., and restored in 1861, also a large county lunatic asylum, erected in 1861. Pop. '71, 6,820.

PRESUMPTION is an inference drawn by the law in certain circumstances or conditions of facts, and is used generally as a mere starting-point in an argument or litigation. Presumptions are often divided into *presumptio juris* and *presumptio juris et de jure.* The former serves as a mere starting-point, and may be rebutted by proof to the contrary. Thus, a person who has possession of goods, is presumed to be the owner till the contrary is proved. A man is presumed to be innocent until the contrary is proved. A *presumptio juris et de jure* is said to be a presumption which cannot be rebutted; but there are few instances of this. Presumptions abound in all departments of the law, and are adopted from the necessity of coming to some conclusion or other in most cases where the evidence is general or inconclusive. Thus, a common illustration is where two persons are drowned at sea, and legal rights depend on the fact which of them survived the other. In such a case, it is presumed, by the law of some countries, that the younger person survives; but there is no presumption in England. But in case of mother and child dying during delivery, the presumption is that neither survived. If a person disappear, and is not heard of, he is presumed to be living. But by an act of parliament this presumption was put an end to, or at least was not allowed to interfere with the right of a married woman to consider herself a widow, after her husband has left her, and has not been heard of for seven years.

PRETENSE, ESCUTCHEON OF, or ESCUTCHEON SURTOUT, in heraldry, a small shield placed in the center of the field of another shield. The husband of an heiress may bear the arms of his wife in an escutcheon of pretense, instead of impaling them. Feudal arms are also sometimes placed on an escutcheon of pretense, particularly in the insignia of elective sovereigns, who have been in use of bearing their own proper arms in surtout over those of the dominions to which they are entitled. The crown of Charlemagne is placed in surtout in the arms of Hanover; and from 1801 to the accession of queen Victoria, the Hanoverian insignia occupied an escutcheon of pretense in the center of the royal arms of the united kingdom.

PRETENDER, OLD and YOUNG. See STUART, CHARLES EDWARD LEWIS CASIMIR, *ante.*

PRETOR (probably a contraction for *præitor*, from *præ-eo*, to precede, also to order) was, among the ancient Romans, the title given to the consuls as leaders of the armies of the state; but it was specially employed to designate a magistrate whose powers were scarcely inferior to those of a consul. The pretorship, in this specific sense of the term, was first instituted in 366 B.C., as a compensation to the patricians for being obliged to share with the plebeians the honors of consulship. It was virtually a third consulship; the pretor was entitled *collega consulibus;* he was elected by the same auspices and at the same comitia. For nearly 30 years, patricians alone were eligible for the office; but, in 337 B.C., the plebeians made good their right to it also. The pretor's functions were chiefly judicial. Though he sometimes commanded armies, and, in the absence of the consuls, exercised considerable authority within the city, yet his principal business was the administration of justice both in matters civil and criminal; and "to the edicts of successive pretors," says Mr. G. Long, "the Roman law owes, in a great degree, its development and improvement." Originally, there was only one pretor; but, as the city and state increased, and their relations with other nations became more complicated, others were added. In 246 B.C. a second pretor was appointed, to settle disputes that might arise between Romans and foreigners temporarily resident at Rome, for trading or other purposes, hence called *prætor peregrinus* (foreign pretor), to distinguish him from the original *prætor urbanus* (city pretor). In 227 B.C., two new pretors were appointed, to administrate affairs in Sicily and Sardinia; and in 197 B.C., two more for the Spanish provinces, or 6 in all. Sulla increased the number to 8, and Julius Cæsar to 16. Augustus reduced the number to 12; but at a later period we read of 18, if not more. The city pretor-ships were reckoned the highest; and after a person had filled these offices, he sometimes received the administration of a province with the title of *proprætor* or *proconsul.*

PRETO'RIAN BANDS (Lat. *prætoriæ cohortes,* and *prætoriani*) the name given, more particularly during the period of the Roman empire, to a body of soldiers, organized for the purpose of protecting the person and maintaining the power of the emperors. We indeed read of a *prætoria cohors,* or select guard of the most valiant soldiers attached to the person of Scipio Africanus, who, according to Festus, received six-fold pay, and the exigencies of the civil wars naturally increased their number; but it was to Augustus that the institution of them as a separate force is owing. He formed 9 or 10 cohorts, each consisting of 1000 men (horse and foot); but kept only three of them in Rome, the rest being dispersed in cities not far off. Tiberius, however, assembled the 9 cohorts at the capital in a permanent camp, and Vitellius increased their number to 16. The pretorians served at first for 12, and afterward for 16 years; they received double pay; the privates were held equal in rank to the centurions in the regular army, and on their retirement each received 20,000 sesterces. They soon acquired a dangerous power, which they exercised in the most unscrupulous manner, deposing and elevating emperors at their pleasure. Aspirants for the imperial dignity found it advisible, and even necessary, to bribe them largely; while those who acquired that dignity without their assistance were accustomed on their accession to purchase their favor by liberal donations. The pretorians, however, had no political or ambitious views; they were simply an insolent and rapacious soldiery, fond of substantial gratifications, and careless how they got them. After the death of Pertinax (193 A.D.), they actually sold "the purple" for a sum of money to Didius Julianus; but in the same year their peculiar organization was entirely broken up by Severus, who formed new cohorts altogether out of the best legions serving on the frontiers, which he increased to four times the number of the old. After several other changes, they were entirely abolished by Constantine (312 A.D.), who dispersed them among his regular legions.

PREVENTION OF CRUELTY TO ANIMALS. See ANIMALS, CRUELTY TO.

PREVEZA, or PREVISA, a busy trading t. on the n. shore of the strait which forms the mouth of the gulf of Arta. It stands in the portion of Epirus which the congress of Berlin in 1878 recommended Turkey to cede to Greece. Pop. 8,000.

PREVOST, AUGUSTINE, 1725–86; b. Switzerland; entered the British army. He was with Wolfe at Quebec, and served through the war of the revolution, in which he attained the rank of maj.gen. He took the fort at Sunbury, Ga., in 1778, made an unsuccessful attempt to capture Charleston in 1779, and in the fall of the same year conducted the successful defense of Savannah against the American forces.

PRÉVOST, PIERRE, 1751–1839; b. Geneva, Switzerland; studied medicine and law, taking his degrees in 1773; was a private teacher in Holland and Paris; appointed professor of philosophy at Berlin in 1780; became professor at Geneva of philosophy in 1793, and of physics in 1810; was a member of the representative council of Geneva 1814–23. His principal works are: *De l'Origine des Forces Magnétiques; Recherches Physico-Méchaniques sur la Chaleur; Traités de Physique Méchanique.* His theory of radiant heat was called Prévost's "theory of exchanges." He edited English classics, and translated several works of English writers.

PREVOST-PARADOL, LUCIEN ANATOLE, a distinguished French littérateur, b. at Paris, Aug. 8, 1829; studied at the collége Bourbon and the ecole normale; in 1851 obtained from the académie the prize for eloquence, and was admitted docteur-és-lettres in 1855. In that year he was named to the chair of French literature by the faculty of Aix; but in the following year resigned it, and became one of the editors of the *Journal des Débats,* writing generally the leading articles. His advocacy of a responsible ministry brought him into difficulties with the censorship. He was twice an unsuccessful candidate for a seat in the chamber. In 1865 he was elected a member of the académie. Believing that the empire had at last adopted the principle of parliamentary government, he consented, in 1870, to fill the post of envoy at Washington; but undeceived by the events connected with the proclamation of war with Prussia, he died by his own hand, July 20, 1870. His chief works are: *Revue de l'Histoire Universelle*, 1854; *Essais de Politique et de Littérature*, 1859–63; *Quelques Pages d'Histoire Contemporaine*, 1862–66.

PRI'AM, King of Troy at the time of the Trojan war, was the son of Laomedon, and Strymo or Placia. The name Priam (derived from *priamai*, to ransom) was given him on account of his having been ransomed by his sister Hesione from Herakles, into whose hands he had fallen. His first wife was Arisbe, daughter of Merops, whom he gave away to a friend in order to marry Hecuba, by whom, according to Homer, he had 19 sons; but as his intercourse with the other sex was not limited to Hecuba, the epic poet gives him in all 50 sons; while later writers add as many daughters. The best-known of these are Hector, Paris, Delphobos, Helenus, Troilus, and Cassandra. Priam is represented as too old to take any active part in the Trojan war; and in Homer, only once appears on the field of battle. The oldest Greek legends—i.e., the Homeric—are silent respecting his fate; but the later poets—Euripides, Virgil, etc.—say that he was slain by Pyrrhus at the altar of Zeus Herkeios, when the Greeks stormed the city.

PRICE, Bonamy, b. England, 1807; educated at Oxford. He became assistant master in Rugby school in 1830, and professor of political economy at Oxford in 1868. He has written *The Anglo-Catholic Theory; The Principles of Currency*, 1869; *Of Currency and Banking*, 1876; and *Practical Political Economy*, 1878. He has positive views to which he gives vigorous expression.

PRICE, Richard, was b. at Tynton, in Wales, Feb. 22, 1723. His father, Rice Price, was a dissenting minister, possessed of some wealth, and remarkable for his intolerance. A leading characteristic of his son's mind, on the other hand, was the calm resolution with which, from his youth, he declared his own opinions, and advocated freedom of thought for others. He declined to bend his convictions to paternal authority; accordingly, on his father's death, Richard was so poorly provided for, that, having resolved to prosecute his studies in London, he was obliged to make the journey chiefly on foot. He obtained admission to a dissenting academy, where he acquired a good knowledge of mathematics, philosophy, and theology. At the end of four years he engaged himself as chaplain to a Mr. Streatfield, with whom he lived for 13 years. Mr. Streatfield, on his death, left Price some property; and his circumstances having been further improved by the death of an uncle in 1757, he was enabled to carry out a matrimonial engagement which he had formed with a Miss Blundell.

He then settled as a preacher at Hackney; but being shortly afterward chosen minister at Newington Green, he removed to that place, where he lived till the death of his wife in 1786, when he returned to Hackney. Meanwhile, his life had been one of considerable literary and scientific activity. His *Review of the Principal Questions and Difficulties in Morals* (Lond., 1758), though a somewhat heavy work, established his reputation as a metaphysician and a moralist. In 1769 the degree of doctor of divinity was conferred on him by the university of Glasgow. In the same year he published his *Treatise on Reversionary Payments;* this was followed by the compilation and publication of the celebrated *Northampton Mortality Tables*, and various other works relating to life-assurance and annuities, forming most valuable contributions to the branch of science to which they refer. In 1776 appeared his *Observations on Civil Liberty and the Justice and Policy of the War with America*. Of this work 60,000 copies are said to have been sold in a few months. So greatly was it admired in the United States, that, in 1778, the American congress, through Franklin, communicated to him their desire to consider him a fellow-citizen, and to receive his assistance in regulating their finances; an offer declined principally on the ground of age. He died April 19, 1791. Price was a believer in the immateriality of the soul, holding that it remained in a dormant state between death and resurrection. Their difference of opinion on this subject led to a controversy of some celebrity between him and his friend Dr. Priestley. His views respecting the Son of God were what is called low or semi-Arian. His moral character appears to have been a singularly beautiful one. "Simplicity of manners," says Dr. Priestley, "with such genuine marks of perfect integrity and benevolence, diffused around him a charm which the forms of politeness can but poorly imitate." See *Memoirs of the Life of Richard Price, D.D.*, by William Morgan, F.R.S., Lond., 1815.

PRICE, Rodman M., b. N. J., 1816; educated at the college at Princeton, but did not graduate; studied law, and after his appointment as purser in the U. S. navy, was, it is said, the first to exercise judicial functions in California under the American flag. In 1848 he was made a navy agent on the Pacific coast, but soon returned to New Jersey; was elected to congress by the democratic party in 1851, and governor of the state in 1854. He was a delegate to the peace conference or "congress" of 1861.

PRICE, Sterling, 1809–67, b. Va.; settled in Missouri in 1830, and was soon afterward elected to the state legislature. He was a member of congress 1845–47; was col. of a Missouri volunteer regiment in the Mexican war; was made brig.gen. in 1847, and soon afterward was appointed military gov. of Chihuahua. He was in command at the battles of Cañada, New Mexico, Jan. 24, 1847, where he was wounded, and of Santa Cruz de Rosales, Mar. 16, 1848. He was governor of Missouri 1853–57, and bank commissioner in 1861. He was the leader of the secession party in the state, and president of the state convention, Feb. 28, 1861. As commander-in-chief of the state forces, he endeavored to force Missouri out of the union. He was compelled to withdraw before gen. Lyon, and on account of the withdrawal of Ben McCullough's troops, was unable to take the state out of the union. Sept. 20 he took Lexington with a large number of prisoners, and was thanked by the confederate congress. In Mar., 1862, he entered the confederate service as maj.gen.; was wounded at Pea Ridge the same month, was at Iuka and Corinth, and led the advance of Pemberton's army in n. Mississippi in December. He was afterward in command of the department of the Arkansas, and in Sept., 1864, invaded Missouri, but was finally driven from the state with heavy loss. After the war he visited Mexico, where he was for some time a member of the board of immigration, but returned to Missouri shortly before his death.

PRICE, THOMAS, 1787–1848; b. at Pencaerelin, Wales; educated for the church at the college of Brecknock; vicar of Cwmdu in 1825. He was an adept in archery and other athletic games. He carved in wood, modeled in wax and cork, etched with success, and played on the harp. The Welsh *Eisteddfods*, or literary gatherings, received his earnest support. He contributed to not less than 15 Welsh periodicals. Besides other works he published in Welsh, *A History of Wales and the Welsh Nation from the Early Ages to the Death of Llewellyn ap Gruffydd*, pronounced the best work on the subject. His most important works are contained in the *Literary Remains of the Rev. Thomas Price, with a Memoir of his Life*, by Jane Williams.

PRICHARD, JAMES COWLES, a distinguished ethnologist and physician, was b. at Ross, in Herefordshire, on Feb. 11, 1786. His father, Thomas Prichard, a member of the society of Friends, and a merchant, had been married young, and was early left a widower with four children, upon whose education he bestowed the greatest care. Of these children, James Cowles, the eldest, was educated at home under private tutors. He learned Latin and Greek from a Mr. Barnes; French from an *émigré* named De Rosemond; and Italian and Spanish from an Italian named Mordenti—while his father himself taught him history, for the study of which young Prichard showed a strong predilection. At Bristol, where his father resided for some time in the pursuit of his business, the embryo ethnologist gave the first indications of his love for the study in which he afterward became famous. On the quays, he met with foreigners from every country, and took much interest in observing their physical appearance, occasionally conversing with the sailors and others, as well as he was able, in their native tongues. On retiring from business, his father again took up his abode at Ross, where the son continued to pursue his studies under private tutors. When the time for choice of a profession arrived, young Prichard chose that of medicine as the one he thought most akin to his ethnological pursuits. He accordingly became a student of medicine, first at Bristol, afterward at St. Thomas's hospital, London, and finally at Edinburgh, where he took his degree of M.D. Before commencing practice, however, he entered himself a student at Trinity college, Cambridge, where he read mathematics and theology for the most part. Subsequently he studied at St. John's college and Trinity college, Oxford. In 1810 he commenced practice in Bristol as a physician. His talents were soon recognized, both privately and publicly. He was first appointed physician to the Clifton dispensary and St. Peter's hospital, and afterward physician to the Bristol infirmary. In 1813, he published his first work, *Researches into the Physical History of Mankind*, which at once gave him a high standing as an ethnologist. Of this, a second and enlarged edition, in 2 vols., appeared in 1826; and a third, still further improved and enlarged, in 5 vols., appeared between the years 1836 and 1847. The second and third editions of this work, each in succession, gave remarkable proofs of the extraordinary zeal with which Dr. Prichard pursued his ethnological investigations; and not only so, for at the same time he devoted himself much to the pursuit of philology, which he rightly judged to be absolutely necessary to an enlarged study of ethnology. In a few years he became acquainted, not only with the Teutonic and Celtic languages, but with Sanskrit, Hebrew, and Arabic, showing a practical result of his studies in the publication of his work entitled *The Eastern Origin of the Celtic Nations*. In this publication, which appeared at Oxford in 1831, he compared the different dialects of the Celtic with the Sanskrit, Greek, Latin, and Teutonic languages, and succeeded in proving a strong affinity between them all, from which he argued in favor of a common origin for all the peoples speaking those languages. His theory has met with general acceptation; and the work in which it appeared, says Mr. Norris, "is admitted by the most distinguished philologists to be unsurpassed in ability and soundness, while not a few deem it to be that which has made the greatest advance in comparative philology during the present century." A previous work—namely, his *Analysis of Egyptian Mythology*, first published in 1819, had the honor of being translated into German in 1837, and edited by A. W. Schlegel, who, however, took occasion to dissent from some of the author's views. In 1843 Dr. Prichard published the first edition of his *Natural History of Man*, in 2 vols. Two other editions of this work appeared during the author's lifetime; and a fourth, ably edited and enlarged, by Mr. Edwin Norris, was given to the world in 1855. Dr. Prichard's other publ ed works are for the most part on medical subjects—namely, ***History of the Epidemic Fevers which prevailed in Bristol during the years*** 1817, '18, *and* '19, published in 1820; *Treatise on Diseases of the Nervous System* (1822); *A Treatise on Insanity and other Diseases affecting the Mind* (1835); and *On the Different Forms of Insanity in Relation to Jurisprudence* (1842). He also contributed various articles to the *Cyclopædia of Practical Medicine* and to the *Library of Medicine*. As a tribute to his eminence as an ethnologist, Dr. Prichard was elected president to the ethnological society; while, in recognition of his researches into the nature and various forms of insanity, he received the government appointment of commissioner in lunacy. This occasioned his removal from Bristol to London, where, unfortunately for the interests of science, he expired of rheumatic fever, Dec. 22, 1848, at the comparatively early age of 62. Dr. Prichard's fame as the greatest of ethnologists, which, during his lifetime, was universally acknowledged, remains undisturbed to this day, notwithstanding any difference of opinion as to his favorite doctrine of the unity of the human race, which he constantly upheld. He was the first to raise ethnology to the rank of a science, and in his work, *The Physical History of Mankind*, he has left behind him a noble monument of his genius, skill, and perseverance.

PRICKLE, *Aculeus*, in botany, a strong and hard, elongated and pointed hair. See HAIRS, in *botany*.—The prickle is connected only with the bark, and not with the wood, in which it essentially differs from the spine or thorn. Prickles are sometimes straight, sometimes curved. They have often a pretty extended base—of some definite shape—by which they are attached to the bark.

PRICKLY ASH. See ARALIA; XANTHOXYLUM, *ante*.

PRICKLY HEAT is the popular name in India and other tropical countries for a severe form of the skin disease known as *lichen*. It more frequently attacks strangers from temperate climates than the natives, although the latter are not altogether exempt from it. The sensations of itching and stinging which attend it are intense, and give rise to an almost irresistible propensity to scratching, which of course only aggravates the irritation. Little or nothing can be done in the way of treatment, except keeping as cool as possible; but the remedies recommended in the article LICHEN may perhaps slightly alleviate the symptoms.

PRICKLY PEAR, or INDIAN FIG, *Opuntia*, a genus of plants of the natural order *cacteæ* (q.v.), having a fleshy stem, generally formed of compressed articulations, sometimes of cylindrical articulations; leafless, except that the youngest shoots produce small cylindrical leaves, which soon fall off; generally covered with clusters of strong hairs or of prickles; the flowers springing from among the clusters of prickles, or from the margin or summit of the articulations, solitary, or corymboso-paniculate, generally yellow, rarely white or red; the fruit resembling a fig or pear, with clusters of prickles on the skin, mucilaginous, generably eatable—that of some species pleasant, that of others insipid. The fruit imparts a red color to the urine. The prickles of some species are so strong, and their stems grow up in such number and strength, that they are used for hedge-plants in warm countries.—The COMMON PRICKLY PEAR or INDIAN FIG (*O. vulgaris*), a native of Virginia and more southern parts of North America, is now naturalized in many parts of the s. of Europe and n. of Africa, and in other warm countries. It grows well on the barest rocks, and spreads over expanses of volcanic sand and ashes too arid for almost any other plant. It is of humble growth; its fruit oval, rather larger than a hen's egg, yellow, and tinged with purple, the pulp red or purple, juicy, and pleasantly combining sweetness with acidity. It is extensively used in many countries as a substantive article of food. In the s. of England the prickly pear lives in the open air, and occasionally ripens its fruit. In America it is cultivated considerably to the n. of its native region. Lime rubbish is often mixed with the soil in which it is to be planted. The fruit is imported into Britain, to a small extent, from the Mediterranean.—The DWARF PRICKLY PEAR (*O. nana*), very similar, but smaller, and having prostrate stems, is naturalized in Europe as far n. as the sunny slopes of the Tyrol.—The TUNA (*O. tuna*), much used in some parts of the West Indies as a hedge-plant, and also valuable as one of the species which afford food to the cochineal insect, yields a pleasant fruit. It has red flowers, with long stamens, which display a remarkable irritability.

PRIDE, in heraldry. A peacock, or other bird, when the tail is spread out in a circular form, and the wings dropped, is said to be "in his pride."

PRIDEAUX, HUMPHREY, an English scholar and divine, was b. of an ancient and honorable family at Padstow, in Cornwall, May 3, 1648. He was educated first at Westminster school, under Dr. Busby; and afterward at Christ church, Oxford, where he took the degree of B.A. in 1672. In 1676 he published an account of the Arundelian Marbles, under the title of *Marmora Oxoniensia*, which greatly increased his fame as a scholar, and in the following year took the degree of M.A. The *Marmora* procured for Prideaux the friendship of the lord chancellor Finch (afterward earl of Nottingham), who, in 1679, appointed him rector of St. Clement's at Oxford, and in 1681 a prebendary of the cathedral of Norwich. After several minor preferments he was collated, in 1688, to the archdeaconry of Suffolk; and in 1702 was made dean of Norwich. He died Nov. 1, 1724. His principal works are his *Life of Mahomet* (1697), which was long very popular, and has gone through many editions, but is now entirely superseded; and *The Connection of the History of the Old and New Testament* (1715–18). The last of these treats with much learning, but less discernment, the affairs of ancient Egypt, Assyria, Persia, Judea, Greece, and Rome, as far as they bear on the subject of sacred prophecy. Prideaux was a zealous but not an intolerant churchman, most conscientious in the discharge of his own duties, equally anxious that others should do theirs, and possessed of a considerably greater share of piety than was usual in his age.

PRIDEAUX, JOHN, 1718–59; b. England; son of sir John Prideaux, bart.; took part in the battle of Dettingen in 1743; fought in America against the French; became col. and brig.gen; was intrusted by William Pitt with the command of the expedition to reduce fort Niagara, in 1759, and while preparing for the siege was killed in the trenches by the accidental bursting of a gun.

PRIDE OF INDIA, PRIDE OF CHINA, or *bead tree.* An oriental tree which has become naturalized in most warm countries. It is a species of the genus *melia*, of the family *meliaceæ*. The pride of India, *melia azederach*, is a native of India and China, and attains a height of from 20 to 40 ft., and a diameter of trunk of about 3 ft. The leaves are bipinnate, each division having five lance-ovate, acuminate, and serrate leaflets. The flowers are in large axillary lilac-colored panicles; calyx small, corolla with spreading petals; stamens 10, united into a tube which forms a conspicuous part of the flower. Fruit about as large as a cherry, ovoid in shape and fleshy, containing a five-celled, five-seeded, elongated, bony nut. The tree is quite common in the southern United States. It is rapid of growth, soon producing an ample shade, but the odor is rather unpleasant. The bark of the root, in which the active principle resides, has been used in medicine from time immemorial as a vermifuge, and it resembles in its physiological and therapeutic action the *spigelia marylandica*, or Carolina pink. Conflicting statements are made in regard to the effects of the berries, some accounts stating that children have been poisoned by eating them, while others are to the contrary. They are eaten by birds and horses and cows, and horses eat the leaves without injury. As a vermifuge the root-bark is used in the form of a decoction, made by boiling two ounces of the bark in a pint of water till it is reduced to one-half. For a child of three to five years a tablespoonful of this is given every three hours till the stomach and bowels are affected, and it should be followed by a cathartic, or infusion of senna may be given with it, as with pink root.

PRIE'GO, a t. of Andalusia, Spain, 45 m. s.e. of Cordova. The inhabitants of Priego are chiefly occupied in husbandry. There are oil-mills, flour-mills, tanneries, and potteries. There were formerly very important silk manufactures, but these have become inconsiderable. Pop. over 13,000.

PRIESSNITZ, VINCENT, the founder of hydropathy (q.v.), was born at Gräfenberg (q.v.), in Austrian Silesia, Oct. 5, 1799. He was the son of a peasant-proprietor, and received at the school of Freiwaldau an education suitable to his station, and afterward farmed his paternal estate. It appears that a neighbor, who had been in the way of healing trifling wounds on himself and others by means of cold water, treated Priessnitz successfully in this way for a serious injury from the kick of a horse; and Priessnitz, having thus had his attention directed to the virtues of cold water, and being indisputably possessed of great sharpness of intellect and aptitude for the practice of the healing art, began to give advice to his neighbors how to cure all ailments with cold water, and soon attained considerable reputation among them. Although several times brought before the authorities for unlicensed practicing, the simplicity of the means he used made it impossible to interfere with him. As the number of applicants for advice went on increasing, he gradually came, by experimental modifications of the way of applying his remedy, to form a kind of system of treatment for the various cases that presented themselves. At last, about 1826, strangers began to repair to Gräfenberg, and stay there for some time for treatment; in 1829 there were as many as 49 water-patients, and in 1837 the number had risen to 586. Priessnitz continued till 1833 to carry on his farming; but after that, his practice, and the care of the establishments which he had to provide for the reception and treatment of his patients, fully occupied him. He died Nov. 28, 1851, leaving his establishment to his son-in-law. Very different judgments have been pronounced on the character of Priessnitz and his system of treatment, mostly according to the prejudices of the critics. He himself has left nothing in writing on his method of cure.—Wunde, *Die Gräf. Wasserheilanstalt und die Priessnitzsche Curmethode* (6th ed., Leip. 1845).

PRIEST (Gr. *presbyteros*, Lat. *presbyter*, Fr. *prêtre*), the title, in its most general signification, of a minister of public worship, but specially applied to the minister of sacrifice or other mediatorial offices. In the early history of mankind, the functions of the priest seem to have commonly been discharged by the head of each family; but on the expansion of the family into the state, the office of priest became a public one, which absorbed the duties as well as the privileges which before belonged to the heads of the separate families or communities. It thus came to pass that in many instances the priestly office was associated with that of the sovereign, whatever might be the particular form of sovereignty. But in many religious and political bodies, also, the orders were maintained in complete independence, and the priests formed a distinct and, generally speaking, a privileged class (see *Egyptian Priests*, *Indian Priests*, below). The priestly order, in most of the ancient religions, included a graduated hierarchy; and to the chief, whatever was his title, were assigned the most solemn of the religious offices intrusted to the body. In sacred history, the patriarchal period furnishes an example of the family priesthood; while in the instance of Melchizedec, king of Salem, we find the union of the royal with the priestly character. In the Mosaic law, the whole theory of the priesthood, as a sacrificial and mediatorial office, is fully developed. The priest of the Mosaic law stands in the position of a mediator between God and the people; and even if the sacrifices which he offered be regarded as but typical and prospective in their moral efficacy, the priest must be considered as administering them with full authority in all that regards their legal value. The Mosaic priesthood was the inheritance of the family of Aaron, of the tribe of Levi. It consisted of a high-priest (q.v.), and of inferior ministers, distributed into 24 classes. The age for admission to the priesthood is nowhere expressly fixed; but from 2d Chronicles xxxi. 17, it would seem that the minimum age was 20. In the service of the temple, the priests were divided into 24 classes, each of which was subject to a chief priest, and served, each company for a week, following each other in rotation. Their duties in the temple consisted in preparing, slaying, and offering victims; in preparing the show-bread, burning the incense, and tending the lights of the sanctuary. Outside, they were employed in instructing the people, attending to the daily offerings, enforcing the laws regarding legal uncleanness, etc. For their maintenance were set aside certain offerings (see FIRST-FRUITS) and other gifts. They wore a distinguishing dress, the chief characteristics of which were a white tunic, an embroidered cincture, and a turban-shaped head-dress. The Jewish priesthood may be said to have practically ceased with the destruction of the temple.

In the Christian dispensation, the name primitively given to the public ministers of religion was *presbyteros*, of which the English name "priest" is but a form derived through the old French or Norman *prestre*. The name given in classical Greek to the sacrificing priests of the pagan religion, Gr. *hiereus*, Lat. *sacerdos*, is not found in the New Testament explicitly applied to ministers of the Christian ministry; but very early in ecclesiastical use, it appears as an ordinary designation; and with all those bodies of Christians, Roman Catholics, Greeks, Syrians, and other orientals who regard the Eucharist as a sacrifice (see MASS), the two names were applied indiscriminately. The priesthood of the Christian church is one of the grades of the hierarchy (q.v.), second in order only to that of bishop, with which order the priesthood has many functions in common. The priest is regarded as the ordinary minister of the Eucharist, whether as a sacrament or as a sacrifice; of baptism, penance, and extreme unction; and although the contracting parties are held in the modern schools to be themselves the ministers of marriage, the priest is regarded by all schools of Roman divines as at least the normal and official witness of its celebration. The priest is also officially charged with the instruction of the people and the direction of their spiritual concerns, and by long-established use, special districts, called parishes (q.v.), are assigned to priests, within which they are intrusted with the care and supervision of the spiritual wants of all the inhabitants. The holy order of priesthood can only be conferred by a bishop, and he is ordinarily assisted by two or more priests, who, in common with the bishop, impose hands on the candidate. The rest of the ceremonial of ordination consists in investing the candidate with the sacred instruments and ornaments of his order, anointing his hands, and reciting certain prayers significative of the gifts and the duties of the office. The distinguishing vestment of the priest is the *chasuble* (Lat. *planeta*). In Roman Catholic countries, priests wear even in public a distinctive dress, which, however, in most respects is common to them with the other orders of the clergy. In the Latin church, priests are bound to a life of celibacy. In the Greek and oriental churches, married men may be advanced to the priesthood; but no one is permitted to marry after ordination, nor is a married priest permitted to marry a second time, should his wife die.

In the church of England, and other Reformed Episcopal churches, the term priest is retained as the designation of the second order of clergy, whose special office it is (1) to celebrate the sacrament of the Lord's-supper; (2) to pronounce the forms of absolution in the morning and evening prayer, in the communion service, and in the office for the visitation of the sick; and (3) to preach, though this last office is, by special license, sometimes extended to deacons.

Priests only can hold a benefice with cure of souls. The age for admission into the priesthood is 24 years. (For the manner and ceremonies of admission see ORDINATION.) Priests in the church of England are ordinarily distinguished during divine service by a black stole of silk worn upon the surplice over both shoulders; deacons, according to the ancient use, wearing it over one shoulder only. Marriage is permitted in the church of England to all orders of the clergy.

Egyptian Priests.—In the political division of Egypt the population is supposed to have been divided into three or four castes, at the head of which was the sacerdotal, or priests. This division, however, was not very strictly observed, as the son did not invariably follow the profession of the father. That of the priest appears most honorable, and two principal classes of priests were in existence at the earliest periods—the *hont*, or prophets, and the *ab*, or inferior priests. The first were attached to the worship of all the deities of Egypt; and in the greater cities there was *hont api*, high prophet, or priest, who presided over the others; at Thebes there were as many as four prophets of Ammon. Their duties appear to have comprised the general cultus of the deity. They also interpreted the oracles of the temples. Besides the prophets of the gods, others were attached to the worship of the king, and to various offices connected with the administration of the temples. The class of priests called *ab*, or "pure," were inferior, and were also attached to the principal deities, and to the personal worship of the monarch. They were presided over by a superintendent, but had no high-priest. A third class of priests, the *karheb*, appear in connection with funeral and other ceremonies, and some other inferior persons of the hierarchy. The *scribes* formed a caste apart, but those who were attached to the temple were of the priestly order. Besides these above mentioned, the Greeks enumerate a variety of sacred officials. The administration of the temples by the hierarchy was as follows: The temple was governed by a superintendent, or *epistetes*, called in Egyptian *mer*, either the high-priest or a prophet. Under him was a vicar, and a royal officer, called *epimeletes*, or overseer, by the Greeks. These attended to the receipts and expenses. Lay brethren, or *hierodules*, attended and assisted the priests in their functions; and in addition to these there were a kind of monks in the Serapeium, who lived within the precincts of the temple, which they were not allowed on any account to quit. At Alexandria, under the Ptolemies, there was a priest of Alexander the great, and others attached to the worship of the deceased Ptolemies, and also one attached to the worship of the living monarch. This priest, it appears, was nominated by the king himself, and drew a revenue from the different temples of Egypt. He was at this period the high-priest of the whole country, and had no doubt superseded the former high-priest of Ptah at Memphis, and of Amen-Raat Thebes, who had formerly exercised a kind of pontificate. On solemn occasions a synod of the priests was held for purposes affecting the whole body. Some light has been thrown on the relative dignities of the hierarchy by the hieroglyphical inscription on a statue of Bakenkhonsou, a high priest of Amen-Ra, now at Munich. At the age of 16 he held a civil employment under Sethos I.; he was then made priest *ab* of Amen-Ra, which office he exercised for four years; after this he rose to the rank of "divine father" of the god, which office he held for 12 years; after that, he became third prophet of the same deity for 15 years; then second prophet for 12 years; and finally, at the age of 59, chief prophet or high-priest of the god—held the post for 27 years, and died at the age of 86. The youthful age at which offices were held was probably owing to the careful education which the young priests had to undergo, and the habits required for the order. They were required to be scrupulously neat and clean, entirely shaven, clad in linen, and shod with papyrus sandals, and to maintain a rigid diet, in which was a careful abstaining from pork, mutton, beans, and salt, to which was added a bath twice a day, and other ablutions. They also fasted, and one of their fasts lasted 42 days; others even longer; they then lived on vegetable food alone, and exercised a rigid continence. They were, however, not unmarried, but allowed one wife. Their support was derived from various sources—as from royal and other endowments of the temples, from the gifts of votaries, and from charges on the produce of the country. On festivals not only were they often clad in fine linen, but the addition of a panther-skin was often added to their attire; and they were anointed with perfumes and unguents. They offered water and burning incense. Although Herodotus has stated that no woman was a priestess in Egypt, many functions connected with the temples were held by women. The most important was that of "divine wife of Amen-Ra," called by Diodorus the *pallakis*, or concubine, of Jupiter, which was conferred upon queens and princesses only. Another title was that of "divine hand," or adorer of the same god, a rank also held by royal personages. During the 4th dynasty, at the time of Cheops and the pyramids, there were prophetesses; but the order does not appear to have been kept up, for at a later period there only appear the *sua*, or singing women of the gods, and the *aha*, or performers, of the principal deities, who attended with *sistra* at the festivals. Besides these, other women had charge of certain things connected with the temple, and *canephoroi*, or basket-bearers. They had no distinctive dress, and were often the wives of prophets or other priests.—Boeck, *Corp. Inscr. Græc.*, p. xxix. p. 303; Schmidt, *De Sacerdot. Ægyptior.*; Wilkinson, *Manners and Customs*, vol. i. p. 257; Devéria, *Monument de Bakenkhonsou* (Paris, 1862).

Indian Priests.—The priesthood of India belongs to the first caste, or that of the Brâhman'as exclusively; for no member either of the Kshattriya, or the Vais'ya, or the Sûdra caste is allowed to perform the functions of a priest. But as the proper performance of such functions requires, even in a Brâhman'a, the knowledge of the sacred texts to be recited at a sacrifice, and of the complicated ceremonial of which the sacrificial acts consist, none but a Brâhman'a learned in one or more Vedas (q.v.), and versed in the works treating of the ritual (see KALPA-SÛTRA), possesses, according to the ancient law, the qualification of a priest; and so strict, in ancient times, were the obligations imposed upon a priest, that any defective knowledge on his part, or any defective performance by him of the sacrificial rites, was supposed to entail upon him the most serious consequences both in this life and in the future. As the duration of a Hindu sacrifice varies from one to a hundred days, the number of priests required at such a ceremony is likewise stated to be varying; again, as there are sacrificial acts at which verses from the R'igveda only were recited; others requiring the inaudible muttering of verses from the

Yajurveda only; others, again, at which verses only of the Sâmaveda were chanted; and others, too, at which all these three Vedas were indispensable—there were priests who merely knew and practiced the ritual of the R'igveda, or the Yajurveda, or the Sâmaveda; while there were others who had a knowledge of all these Vedas and their rituals. The full contingent of priests required at a great sacrifice amounts to 16. Other inferior assistants at a sacrifice, such as the ladle-holders, slayers, choristers, and the like, are not looked upon as priests. Such was the staff of priests required at the great and solemn sacrifices which took place on special occasions, and could be instituted only by very wealthy people; from one to four priests, however, sufficed at the minor sacrifices, or those of daily occurrence. These were the rules and practices when the Hindu ceremonial obeyed the canon of the Vaidik ritual; and the latter probably still prevailed at the epic period of India, though many deviations from it are perceptible in the Mahâbhârata and Râmâyan'a (q.v.). But at the Paurân'ik period, and from that time downward, when the study of the Vedas had fallen into disuse, and the Vaidik rites had made room for other ceremonies which required no knowledge on the part of a priest, except that of the reading of a prayer-book, and an acquaintance with the observances enjoined by the Purân'as, but easy to go through, almost every Brâhman, not utterly ignorant, became qualified to be a priest. For the priesthood of the Buddhists, Jainas, and Thibetans, see BUDDHISM, JAINAS, and LAMAISM.

PRIESTLEY, JOSEPH, son of Joseph Priestley, a cloth-draper at Fieldhead, near Leeds, was born at Fieldhead, Mar. 18, 1733, O.S. His mother having died when he was six years old, he was adopted by an aunt, by whom he was sent to a free school. There he learned Latin and Greek. During vacation, he taught himself various languages, both ancient and modern. For some time he was obliged to abandon his studies, owing to weak health; he then betook himself to mercantile pursuits. With returning strength, his literary studies were resumed, and successfully prosecuted at a dissenting academy at Daventry under Mr. (afterward Dr.) Ashworth, successor to Dr. Doddridge. Though his father and aunt were strong Calvinists, their house was the resort of many men who held very different opinions; and the theological discussions which he was in the habit of hearing seem to have had much effect on young Priestley: before he was 19 he calls himself rather a believer in the doctrines of Arminius, but adds, "I had by no means rejected the doctrine of the trinity or that of the atonement." Before leaving home, he wished to join a Calvinistic communion; but he was refused admission, the ground of refusal being that he had stated doubts as to the liability of the whole human race to "the wrath of God and pains of hell forever." During his residence at the academy, he conceived himself called on to renounce nearly all the theological and metaphysical opinions of his youth. "I came," he says, "to embrace what is called the heterodox side of every question." In 1755 he became minister to a small congregation at Needham Market, in Suffolk, with an average salary of £30 per annum. While here, he composed his work entitled *The Scripture Doctrine of Remission, which shows that the Death of Christ is no proper Sacrifice nor Satisfaction for Sin.* His leading theological doctrine seems to have been that the Bible is indeed a divine revelation, made from God to man through Christ, himself a man and no more, nor claiming to be more. He seems to have rejected all theological dogmas which appeared to him to rest solely upon the interpretation put upon certain passages of the Bible by ecclesiastical authority. Even the fundamental doctrines of the trinity and of the atonement he did not consider as warranted by Scripture, when read by the light of his own heart and understanding. It does not, however, appear that these doctrinal errors produced any morally evil results. He not only contrived to live on £30 a year; but, by adding a little to his income by means of teaching, he was enabled to purchase a variety of instruments to help him in his scientific studies. In 1758 he quitted Needham for Nantwich; and in 1761 he removed to Warrington, where he was appointed successor to Mr. (afterward Dr.) Aikin, as teacher of languages and *belles-lettres.* At Warrington, he married Miss Wilkinson, a lady of great talent and amiability. Here his literary career may be said first fairly to have begun. A visit to London led to his making the acquaintance of Franklin and of Dr. Price. The former supplied him with books which enabled him to write his *History and Present State of Electricity*, published in 1767. It was followed by a work on *Vision, Light, and Colors.* In 1762 he published his *Theory of Language and Universal Grammar.* In 1766 he was made a member of the royal society, and a doctor of laws by the university of Edinburgh. In the following year he removed to Millhill, near Leeds, where he was appointed minister of a dissenting chapel. The fact of a brewery being beside his dwelling gave a new direction to his energetic and versatile mind; he began to study pneumatic chemistry, publishing various important works connected with this science. "No one," says Dr. Thomson, "ever entered on the study of chemistry with more disadvantages than Dr. Priestley, and yet few have occupied a more dignified station in it." While at Leeds, he agreed to accompany capt. Cook on his second voyage; but certain ecclesiastics having objected to the latitude of his theological views, the board of longitude refused to sanction the arrangement, and he did not go. In 1773 he was appointed librarian and literary companion to lord Shelburn, with a salary of £250 per annum, and a separate residence. He accompanied the earl on a continental tour in the year 1774. Having been told by certain Parisian savants that he was the only man they had ever known, of any understanding, who believed in Christianity, he wrote, in reply, the *Letters to a Philosophical Unbeliever*, and various other works, containing criticisms on the doctrines of Hume and others. His public position was rather a hard one; for while laughed at in Paris as a believer, at home he was branded as an atheist. To escape the odium arising from the latter imputation, he published in 1777 his *Disquisition Relating to Matter and Spirit.* In this work, while he partly materializes spirit, he at the same time partly spiritualizes matter. He holds, however, that our hopes of resurrection must rest solely on the truth of the Christian revelation, and that on science they have no foundation whatever. The doctrines of a revelation and a resurrection appear with him to have supported one another. He believed in a revelation, because it declared a resurrection; and he believed in a resurrection, because he found it declared in the revelation. On leaving lord Shelburn, he became minister of a dissenting chapel at Birmingham. The publication, in 1786, of his *History of Early Opinions Concerning Jesus Christ,* occasioned the renewal of a controversy which had begun in 1778 between him and Dr. Horsley, concerning the doctrines of free will, materialism, and unitarianism. The victory in this controversy will probably be awarded by most men in accordance with their own preconceived views on the questions at issue. His reply to Burke's *Reflections on the French Revolution* led to his being made a citizen of the French republic; and this led to a mob on one occasion breaking into his house and destroying all its contents, books, manuscripts, scientific instruments, etc. He states that the sum awarded to him as damage fell £2,000 short of the actual pecuniary loss. A brother-in-law, however, about this time left him £10,000, with an annuity of £200. In 1791 he succeeded to the charge at Hackney, which had become vacant by the resignation of Dr. Price. He did not remain long here, however. His honestly-avowed opinions had made him as unpopular as an honest avowal of opinions generally does. He removed to America, where he was received with respect, if not with enthusiasm. He had the offer of the professorship of chemistry at Philadelphia, which he declined. In 1796 his wife died. To the day of his death, he continued to pursue his literary and scientific pursuits with as much ardor as he had shown at any period of his active life. He died Feb. 6, 1804, expressing his satisfaction with his having led a life so useful, and his confidence in immortality. At Paris, his *éloge* was read by Cuvier before the national institute. He has given us his autobiography down to Mar. 24, 1795. He was a man of irreproachable moral and domestic character, remarkable for zeal for truth, patience, and serenity of temper. He appears to have been fearless in proclaiming his convictions, whether theological, political, or scientific. See memoirs of his own life, continued by his son, with observations by T. Cooper. Also life by John Corry.

PRIESTS OF THE ORATORY. See ORATORY, CONGREGATION OF THE, *ante.*

PRILOO'KI, a district t. of Little Russia, in the government of Poltava, and 150 m. n.w. of the town of that name. Tobacco, corn, cattle, and tallow are the principal articles of trade, and are sold on the spot to dealers for export to Moscow, St. Petersburg, Riga, Poland, and abroad. The climate is good, and the soil fertile. Pop. '67, 10,670, most of whom are engaged in the cultivation of tobacco.

PRIM, JUAN, Count of Reus, 1814–70; b. Spain; entered the army at an early age. For the assistance which he rendered Narvaez in securing the downfall of Espartero in 1843, he was made count, and appointed gen. and gov. of Madrid. In 1844, on account of his defection from Narvaez, the latter had him sentenced to imprisonment for 6 years. He was soon pardoned by the queen, who made him gov. of Porto Rico. He led the progressive party in the cortes 1848–53, was in exile 1853–58, and commanded the Spanish army in Morocco 1859–60. For his victory at Los Castillejos he was made marquis de los Castillejos. In 1862 he was commander of the Spanish troops in Mexico, who were intended to act in conjunction with the French and English forces, but left on account of his unwillingness to assist Napoleon III. In 1864 he was driven from Madrid, accused of participating in a military conspiracy, and in 1866 he began an unsuccessful insurrection against the O'Donnell government. In 1868, in association with Serrano and Topete, he dethroned Isabella. Serrano became regent, and Prim was appointed commander-in-chief, minister of war, and president of the council. Prim's selection in 1870 of prince Leopold of Hohenzollern brought on the Franco-Prussian war. He afterward called Amadeus to the throne, but died from wounds inflicted by assassins before Amadeus arrived at Madrid.

PRIMA DONNA (Ital.), the first female singer in an opera.

PRI'MARY, or PRIMITIVE LIMESTONE, the name formerly given to crystalline limestones, because it was supposed that they belonged to the oldest primary deposits. But as it is now known that many of these limestones are of much later origin, some even as late as the tertiary period, the name has fallen into disuse. See MARBLE.

PRI'MATE (Lat. *primus*, Fr. *primat*, first) is the title of that grade in the hierarchy which is immediately below the rank of patriarch. The title strictly belongs to the Latin church, but in its general use it corresponds with that of exarch (Gr. *exarchos*) in the Greek church, although there were some exarchs who were not immediately subject (as were all primates) to a patriarch. This arose in the eastern church from the variation in the limits of the patriarchates, which were not of simultaneous origin; but in the west, where the patriarch (i.e., the Roman bishop) was recognized as possessing universal jurisdiction, this exemption of any particular primate from superior jurisdiction could not of course arise. The primate, as such, was the head of a particular church or country, and held rank, and, in some churches, a certain degree of jurisdiction, over all bishops and archbishops within the national church. This jurisdiction, however, was confined to the right of visitation and of receiving appeals. In Africa, the bishop of Carthage, without the title, possessed all the rank and authority of a primate. The chief primatial sees of the west were: in Spain, Seville and Tarragona, afterwards united in Toledo; in France, Arles, Rheims, Lyons, and Rouen (among whom the archbishop of Lyons claims the title of *primat des primats*, "primate of the primates"); in England, Canterbury; in Germany, Mainz, Salzburg, and Trier; in Ireland, Armagh, and for the Pale, Dublin; Scotland, St. Andrews; in Hungary, Gran; in Poland, Gnesen; and in the northern kingdoms, Lund. In the church of England the archbishop of Canterbury is styled primate of all England; the archbishop of York, primate of England.

In Ireland, the archbishop of Armagh is primate of all Ireland, and the archbishop of Dublin primate of Ireland. The title of primate in England and Ireland confers no jurisdiction beyond that of archbishop. The name *primus* is applied in the Scottish Episcopal church to the presiding bishop. He is chosen by the bishops out of their own number, without their being bound to give effect to seniority of consecration or precedency of diocese.

PRIMATÉS, the name given by Linnæus to the first order of mammalia in his system, and which he placed first (whence the name, Lat. *primus*, first), because he ranked man amongst them, and accounted them highest in the scale of nature. He assigned as the characters of the order, incisor teeth in the front of the mouth, four in the upper jaw, in one row; mammæ two, pectoral. In this order he placed four genera, *homo* (in which he included man and the orang-outang), *simia*, *lemur*, and *vespertilio;* corresponding to the *bimana* (man alone), *quadrumana*, and *cheiroptera* of Cuvier. That many of the primates of Linnæus really occupy a higher place in the scale of nature, either as to organization or intelligence, than many other mammalia, is more than doubtful.

PRIME (Lat. *prima*, the first—i.e., hour), the first of the so-called "lesser hours" of the Roman breviary (q.v.). It may be called the public morning-prayer of that church, and corresponds in substance with the morning service of the other ancient liturgies, allowance being made for Latin peculiarities. Prime commences with the beautiful hymn of Prudentius, *Jam lucis orto sidere*, which is followed by three and occasionally four psalms, the last portion of which consists of the opening verses of the 118th (in the authorized version, 119th) psalm, which is continued throughout the rest of the "lesser hours." Prime concludes with prayers appropriate to the beginning of a Christian's day.

PRIME, Benjamin Young, 1733–91; b. Long Island, N. Y.; graduated at the college of New Jersey in 1751; took his medical degree at Leyden. He wrote essays in Hebrew, Greek, Latin, French, and Spanish, and many songs and ballads which were very popular during the revolutionary war. Among his publications are *The Patriot Muse, or Poems on Some of the Principal Events of the Late War*, by an American; *Columbia's Glory, or British Pride Humbled; A Poem on the American Revolution; Muscipula Cambryomachia.*

PRIME, Edward Dorr Griffin, b. N. Y., 1814; graduated at Union college in 1832, and at Princeton theological seminary in 1838; was pastor of a Presbyterian church at Scotchtown, N. Y., 1839–51; became associate editor of the *New York Observer* in 1853; chaplain at Rome in 1855; resumed his connection with the *Observer* in 1855, and became one of the proprietors in 1865. He traveled extensively 1869–70, and published on his return *Around the World: Sketches of Travel Through Many Lands and over Many Seas.* He is the author also of *Forty Years in the Turkish Empire, or Memoirs of the Rev. William Goodell, D.D., Missionary of the A. B. C. F. M.* He has written many letters under the signature of Eusebius.

PRIME, Samuel Irenæus, D.D., b. at Ballston, N. Y., 1812; graduated at Williams college, Mass., in 1829; studied theology at Princeton, N. J.; preached one year at Ballston and three years at Matteawan, N. Y., on the Hudson. In 1840 he became one of the editors and proprietors of the *New York Observer*, with which he is still connected. He has published numerous works, the most important of which are the following: *Travels in Europe and the East*, 2 vols.; *Letters from Switzerland; The Alhambra and the Kremlin; Life in New York; Annals of the English Bible: Thoughts on the Death of Little Children; The Power of Prayer; Five Years of Prayer; The Bible in the Levant; Memoirs of the Rev. Nicholas Murray, D.D; Life of Samuel F. B. Morse.*

PRIME, William Cowper, b. N. Y., 1825; graduated at the college of New Jersey in 1843; was admitted to the bar in New York, and practiced law until 1861, when he became proprietor and editor of the *Journal of Commerce.* He has published *The Owl Creek Letters; Boat-Life in Egypt and Nubia; Tent-Life in the Holy Land; Coins, Medals, and Seals, Ancient and Modern, Illustrated and Described; O Mother Dear, Jerusalem—The Old Hymn, its Origin and Genealogy;* an edition in fac-simile of Albert Durer's *Little Passion.*

PRIME-MOVER. A machine transforming apparent natural energy into visible work, and varied in form relatively to both. Man himself is the highest prime-mover and standard of natural construction. Next are the animals, greater muscular examples, foreshadowing the division of the translators of energy into classes, relating more to the work to be performed than to the energy to be transformed. While prime-movers are parallel in many points to the machines which they drive, they are almost alone in requiring a construction adapted to the driving-power; demanding a distinct region of scientific principles, and thus a "science of power" or "first motion." Exhausting a visible energy, they demand an economy, in per cent of work, from each "destruction;" thus, greater than machines, they become motors.

The sources of apparent energy in nature, made actual through prime-movers, are muscular energy, gravitation, and heat; the two latter respectively including falling water and atmospheric movements; electricity and magnetism. Although the heat-mover, or steam-engine, holds the first place, yet it was preceded in history by the united force of animals directed by men upon various objects; and by the windmill—to the prairie what the water-wheel is to the river—the oldest mechanical survivor of antiquity, claiming to add to the short list a fourth source of energy—horizontal velocity. After the windmill were the water-wheels, in many forms; then appeared the last of the "directly visible" powers; that preceded the heat-engine—Barker's mill, a rude form, giving power and prophesying the turbine. This gave control of the force of gravity, expressed in the vertical fall from level to level, of bodies of water; a force equivalent in foot-pounds to the product of the weight of the water multiplied by the feet of fall, equaling the energy increased continually to the point of shock on the water-wheel; where, intercepted in its force, it loses an energy equal to the work "attached" to the wheel; thus with light work losing most of the energy of the body of water. Even older than the wheel is the water-engine, a slow mover, in its construction forerunner of the steam-engine. The heat-engine, in the form of steam-engine used for propulsion, exerted an influence upon the stationary engine, that produced the turbine as a competitor against the wheel, grown obsolete, and against the new power, threatening to take the place of the waterfall. In turn, as special purposes sought special prime-movers, appeared hot-air, gas, and electro-dynamic engines; restricted in their applications, but in those superior; and again, in turn, we shall probably see electricity in various developments; then the applied force of the tides, great natural prime-movers, replacing the turbine in its first importance; then the sun's heat gathered and applied in tropical lands for the uses of a new civilization.

PRIMITIVE WESLEYANS originated in the excitement produced by the introduction of camp-meetings into England by Lorenzo Dow about 1807. William Clows, a Wesleyan local preacher, united in the services at these meetings, and Hugh Bourne, a layman of prominence, wrote a pamphlet in their defense, to which the preachers of several circuits replied. In 1807 the conference disclaimed connection with them; in 1808 expelled Bourne, and in 1810, Clows also. Both, however, continued their meetings and, in 1810, established the Primitive Methodist connection, retaining the doctrines and discipline of Wesleyan Methodism; striving to restore the original simple dress and manner of living; reviving Wesley's custom of "out-door preaching;" and licensing women to preach. Two-thirds of their annual conference are laymen. They have been very useful among the poor and neglected classes at home; and have established several missions abroad. In 1880 they reported, exclusive of Canada, 174,469 members; 1041 traveling preachers; 14,244 local preachers; 10,220 class leaders; 5,918 chapels and other preaching places; 3,884 Sunday-schools, containing 57,016 teachers, 363,336 scholars, and 7,772 catechumen members; church property valued at over $10,000,000; and a theological school at Manchester.

PRIMOGENITURE is the rule of law under which the eldest son of the family succeeds to the father's real estate in preference to, and in absolute exclusion of, the younger sons and all the sisters. This is the rule adopted in Britain and in most European countries, though latterly the policy of the rule has been disputed, and the contrary example of France pointed to as an example or a warning, according to the theory advocated. The rule operates as follows: whenever a man dies intestate, leaving real estate—i.e., lands and houses—his eldest son is the only person entitled by law to the whole; and if the other brothers and sisters are not otherwise provided for out of the personality they are left destitute. If the eldest son is dead, but has left an eldest son, such grandson of the deceased, in like manner, succeeds to the whole lands exclusively, and so on, following in succession, the eldest sons of eldest sons, and their next eldest sons, one by one, in their order of seniority. But when the male line is exhausted, then females do not succeed in the same way singly and by seniority, but all together succeed jointly. Such is the rule in England and in Scotland. The preference of males to females was also the Jewish rule and the Greek rule, or at least that which prevailed at Athens; but it was unknown to the Romans. It is generally said our preference of males took its origin from the feudal system, by which the devolution of land depended on the personal ability of the party to perform military service. Our Danish ancestors seem not to have acknowledged any preference of the males, but the Saxons did so. Our law does not, like the Salic law, totally exclude females, but merely postpones them until the males are exhausted. Though, however, it is the general law of England, as well as Scotland and Ireland, there is one county in England, that of Kent, where, by ancient custom—called gavelkind—a different rule prevails, and the land, instead of going wholly to the eldest son, is divided equally among all the sons. So there is an exception, called Borough English, in some boroughs and cities of England, where the land, instead of going to the eldest son, goes wholly to the youngest son. The evils said to be attendant on the law of primogeniture are alleged to be, that it often produces great hardship, by making one of the family enormously rich, and the others very poor, thereby introducing a sense of inequality and injustice among those who are apt to believe themselves equals by the law of nature. It also tends to encourage the accumulation of landed property in a few hands, and thereby cuts off the great mass of the people from the gratification of a natural desire and from one incentive to industry—viz., the acquisition of a portion of the soil. On the other hand, it is said that the cases of hardship in reality seldom occur, for, especially in modern times, an equal amount of personal property is often held by the same owners, and the rule does not apply to personality, which is equally divided among all the children. Moreover, the great land-owners seldom die intestate, but almost invariably provide for their younger children by means of charges or burdens on the family estate, and so counteract the effect of the law of primogeniture. The accumulation of landed property is said to be not an evil, but the contrary, for it enables agriculture to flourish, inasmuch as the larger the farms, the greater is the capital required, and the greater benefit to the land, and ultimately to the public. The law of primogeniture in England is not as it is or was in Scotland, stereotyped in its most odious form by the practice of entailing the lands, and so locking them up for generations in one family, secluding them from commerce, and of necessity preventing the successive heirs in possession from making improvements. The evils of the Scotch entail system have long been exposed, and led, in 1848, to a relaxation of the law, by which the practice of disentailing the property is made more easy and frequent. But in England, land cannot be locked up for a greater period than the lives of persons in existence, and for 21 years more, after which the parties entitled can sell or bring the lands into the market at their discretion; so that it is not correct to say that the accumulation of land in the great families is caused by the law of primogeniture, for practically each successive generation can do what it likes with the property, and squander it at will. It is only by the operation of the natural feelings of family pride that the family estates are kept together in a family. The mode in which this is practically done in England is as follows: the peer or head of the family being tenant for life, and the inheritance being entailed upon his eldest son, who is about to marry, the father and son take the proper steps (which they can always do jointly) for unsettling the estate, and obtaining the absolute dominion over it. They then proceed to resettle the estate, making the father as before tenant for life, then the son is reduced in his turn to a tenant for life also, after the father, instead of, as before, being tenant in tail, or full proprietor. Thus, the maintenance of the family dignity is secured for another generation by settling the inheritance on the eldest male issue of the intended marriage; and when the grandson attains the age of 21, or is about to marry, he and his father act in the same way toward the next generation. The English law of landed property has been said to answer admirably all the purposes to which it is applicable, for a testamentary power is given which stimulates industry, and encourages accumulation; and while capricious limitations, such as perpetual entails, are restrained, property is allowed to be molded according to the circumstances and wants of every family.

PRIMORSK, or LITTORAL PROVINCE, a division in e. Siberia, bounded by the Pacific ocean, the Okhotsk, Japan, Behring, and Polar seas and Behring strait; adjoining Mantchooria and Yakutsk; lying between 42° 20′ and 70° n. lat., and 131° e. to 170° w. long.; 731,942 sq.m.; pop. '67, 43,320. The division is traversed in the n. by mountain ranges. The Amoor and the Anadyr are the chief rivers. The islands of Saghalien and the Russian Kuriles form part of the province, which belongs to the general division of e. Siberia as established in 1865. The government is by a governor, subordinate to the governor-general of the grand division, and by a council of regency. The inhabitants are of many races, including Russians, Japanese, Mantchoos, Kamtchadales, and others. Capital, Nikilayevsk, opposite Saghalien.

PRIMROSE, *Primula*, a genus of plants of the natural order *primulaceæ*, having a bell-shaped or tubular 5-toothed calyx, a salver-shaped corolla with five segments, five stamens, a globose germen containing many ovules, and a many-seeded capsule opening by five valves, and generally with ten teeth at the apex. The species are all herbaceous perennials, generally having only radical leaves; and the flowers in a simple umbel, more rarely with scapes bearing solitary flowers. Almost all of them are natives of Europe and the n. of Asia. Some of them are among the finest ornaments of our groves and meadows; some are found in mountainous regions. Their fine colors and soft, delicate beauty have led to the cultivation of some of them as garden flowers, probably from the very beginning of floriculture. The name primrose (Fr. *primevère*, Lat. *primula*) is derived from the Latin *primus*, first, and refers to the early appearance of the flowers of some of the most common species in spring.—The COMMON PRIMROSE (*P. vulgaris*), abundant in woods, hedgebanks, and pastures in Britain and in most parts of

Europe, has obovate-oblong, wrinkled leaves, and single-flowered scapes; the flowers about an inch broad, yellowish-white. This is the plant to which the English name primrose specially belongs. Akin to it is the cowslip (q.v.), or Paigle (*P. veris*), and perhaps still more nearly related is the Oxlip (*P. elatior*), apparently wild in some parts of England, particularly in the eastern counties; but supposed by some botanists to be intermediate between the common primrose and the cowslip, which they therefore regard as extreme forms of one species.—The polyanthus (q.v.) is a cultivated variety of the cowslip.—The auricula (q.v.) (*P. auricula*), an Alpine species, is a favorite garden flower.—The Bird's-Eye Primrose (*P. farinosa*) and the Scottish Primrose (*P. Scotica*) are both flowers of exquisite beauty, found in the northern parts of Britain; the latter chiefly on the coasts of Sutherland, Caithness, and the Orkney islands. The Alps and the Himalaya mountains produce several species. The Chinese Primrose (*P. Sinensis*) has for more than 40 years been very common in Britain, not only as a green-house but a window plant. It produces compound umbels of very numerous lilac or white flowers, which are displayed in autumn, winter, and spring.

PRIMULACEÆ, a natural order of exogenous plants, containing more than 200 known species, mostly natives of temperate and cold regions. They are all herbaceous, or scarcely half-shrubby, with leaves generally all radical, and no stipules. The calyx is generally 5-cleft, inferior or half-superior, regular, persistent; the corolla, with the limb divided into as many segments as the calyx, rarely wanting; the stamens inserted on the corolla, one opposite to each of its lobes; the ovary one-celled, the style solitary, the stigma capitate; the capsule with a central placenta and many seeds. Many of the primroses have flowers of much beauty, and some are very fragrant, as the primrose, cowslip, auricula, pimpernel, loosestrife, etc.

PRI'MUM MOB'ILE. See Ptolemaic System.

PRINCE (Lat. *princeps*, from *primus*, first, and *capio*, I take), an epithet which was originally applied to the *princeps senatûs* of the Roman state, and afterward became a title of dignity. It was adopted by Augustus and his successors; hence the word was afterward applied to persons enjoying kingly power, more especially the rulers of small states, either sovereign, as in the case of the ancient princes of Wales; or dependent, like the rulers of certain states in Germany. The title is now very generally applied to the sons of kings and emperors, and persons of the blood-royal. In various parts of continental Europe, the title prince is borne by families of eminent rank, but not possessed of sovereignty; and in England a duke is, in strict heraldic language, entitled to be styled "high puissant and most noble prince," and a marquis or earl as "most noble and puissant prince." Practically, however, in Britain, the term prince is restricted to members of the royal family. The eldest son of the reigning sovereign is by a special patent created prince of Wales, and this is the only case in which the title prince is connected with a territorial distinction. In Germany, the ambiguity of applying the same title to the members of royal houses and princely families, not sovereign, is avoided, the former being styled "prinz," the latter "fürst." The German fürst takes rank below the duke (herzog). Most of the counts who had a seat in the old German diet were elevated to the dignity of prince on their acquiescence in the dismemberment of the German empire. In a more general acceptation, the term prince is often used for a sovereign or the ruler of a state.

PRINCE, a co. in n.w. Prince Edward's island, in the gulf of St. Lawrence, having the waters of Northumberland strait on the s. and w., forming Bedeque bay and Egmont bay on the s.w., and Tignish bay and Holland bay on the n.e.; 787 sq.m.; pop. '71, 28,302. It is intersected by the Prince Edward island railroad, terminating at Tignish bay. Its surface is undulating and well-timbered, with a fertile soil well cultivated. Lumber is extensively manufactured, and ship-building is carried on. Live stock are exported, also eggs, potatoes, and oysters. Within its limits are several islands known as agreeable summer resorts. Co. seat, Summerside.

PRINCE, Thomas, 1687–1758; b. Mass.; graduated at Harvard college in 1707; traveled in Europe for several years; returned to America in 1717, and was ordained colleague of the rev. Dr. Sewall of the Old South church of Boston. He bequeathed to the Old South a valuable library, part of which was lost when the British soldiery had possession of the building, and of the remainder in the Boston public library a catalogue was made in 1868. Prince was distinguished for his learning and pulpit abilities. He published, besides many sermons, the following works: *An Account of the First Appearance of the Aurora Borealis; A Chronological History of New England in the Form of Annals; Account of the English Ministers on Martha's Vineyard; An Improvement of the Doctrine of Earthquakes, containing an Historical Summary of the most remarkable Earthquakes of New England; New England Psalmbook revised and improved.*

PRINCE EDWARD, a co. in s. Virginia, bounded by the Appomattox river, and the Nottaway river; traversed by the Richmond and Danville, and the Atlantic, Mississippi and Ohio railroads; about 325 sq.m.; pop. '80, 14,668—9,817 colored. The surface is uneven, and contains coal. The soil is fertile. The principal productions are corn, tobacco, wheat, and oats. Co. seat, Farmville.

PRINCE EDWARD, a co. in s. Ontario, consisting of a peninsula surrounded by lake Ontario, connected with the main-land in the n.w.; 374 sq.m.; pop. '71, 20,336. The lake forms among the islands on the n.e. which are included in the county several bays and inlets—Quinté bay in the n., and Prince Edward's bay in the s.e., and West Lake on the s.w. It has several important fishing stations, and manufactures of iron, plaster, steam-engines, and machinery; also breweries, potteries, tanneries, and lumber mills. Co. seat, Picton.

PRINCE EDWARD ISLAND, a province of the dominion of Canada, in the s. of the gulf of St. Lawrence, and separated from New Brunswick and Nova Scotia by the strait of Northumberland, lat. about 45° 56' to 47° 4' n., long. 62° to 64° 23' west. Length, 130 m.; breadth, 4 to 34 m.; area, 2,173 sq. miles. Pop. '41, 47,034; '48, 62,678; '71, 94,021. The surface is undulating; but few of the hills, the chief of which are in the middle of the island, and run from n. to s., are upward of 300 ft. in height. The coasts are girdled by a bold line of red sandstone cliffs, varying in height from 20 to 100 ft., and are indented with numerous bays and inlets, several of which, as Cardigan bay an the e., the entrance to Georgetown, and Hillsborough bay on the s., the entrance to Charlottetown (the capital of the colony), are deep and spacious, and afford safe anchorage for large vessels. Other inlets are Bedeque and Egmont bays on the s., and Holland, Richmond, and St. Peter's bays on the north. The rivers are mostly short. The soil, which is well watered with numerous springs and rivers, rests upon red sandstone, and consists for the most part of a layer of vegetable matter above a light loam, which rests upon stiff clay above sandstone. It is of great fertility, and the agricultural products are about double the quantity required for local consumption. Of the whole area, consisting of 1,360,000 acres, 1,300,000 acres are "good" land, and 60,000 acres are "poor" land; and in 1851 there were under cultivation 215,380 acres; in 1871, 1,097,860 acres. Since the year 1848 agriculture has become a much more important branch of industry. Between 1848 and 1861 the agricultural products had increased in many instances four-fold. In 1871 the amount of wheat produced was 269,392 bushels; of barley, 176,441 bushels; oats, 3,128,576 bushels; beans and peas, 1826 bushels; maize, 2,411 bushels; and potatoes, 3,375,726 bushels. In April, 1871, the live stock in the colony comprised 25,329 horses, 62,984 large cattle, 147,364 sheep and lambs, and 52,514 pigs. The soil and climate are admirably adapted for producing wheat, and all the cereals, fruits, and vegetables grown in temperate climes are produced here. The climate, milder than that of the continental regions in the vicinity, and free from the fogs which prevail on cape Breton and Nova Scotia, is very healthy. Prince Edward Island is extremely poor in minerals; copper and bog-iron ore are known to exist in small quantities. In the neighboring waters extensive and profitable fisheries are carried on. The fish caught are principally mackerel, salmon, alewives or gaspereaux (of the herring family), herrings, codfish, and hake. Manufactures are not important, though cloth is made to some small extent. The Prince Edward Island railway, 198 m. in length, was opened in 1875. It is constructed on a 3 ft. 6 in. gauge, and cost about £3,300 per mile. The value of total imports for 1873–74 amounted to £382,740; of the exports, to £144,426. The revenue of the colony for 1874 was £81,270; the expenditure, £88,780. The colonial government was vested in a lieutenant-governor, a house of assembly, a legislative council, and an executive council appointed by the lieutenant-governor. The legislature of Prince Edward Island declined to agree to the plan for a union of the British North American colonies which resulted from the negotiations begun in 1864; but at last, in 1873, this colony entered the confederation, and became one of the provinces of the dominion. Charlottetown, the provincial capital, had in 1871 a pop. of 8,807 (now 10,000). In 1878 Prince Edward Island possessed 342 vessels of 55,547 tons. There are in the province a college, a normal school, a model school, 18 grammar schools, and about 370 district schools. Tuition is free to all but the college, with the exception of a small fee for fuel. In 11 months ended Jan. 1, 1874, £11,838 was disbursed from the colonial treasury for public education. The island is divided into 3 counties—Prince, Queen's, and King's counties—of which the chief towns are respectively Summerside, Charlottetown, and Georgetown. All parts of the island are traversed by coach-roads; and the island has a telegraphic system, partly submarine. The railway crosses the island, connecting Charlottetown with Tignish on the n.w., and Georgetown and Souris on the s.e. The island was first taken possession of by the British in 1745, and was retaken by them, and finally annexed to their possessions in 1758.

PRINCE GEORGE, a co. in s.e. Virginia; drained by the James and Appomattox rivers, its n. and n.w. boundaries, and also by the Blackwater; traversed by the Atlantic, Mississippi and Ohio railroad; 280 sq.m.; pop. '80, 8,861—8,756 of American birth; 5,981 colored. The chief products are corn, wheat, oats, and pork. Co. seat, Prince Georges's Court-house.

PRINCE GEORGE'S, a co. in s. Maryland, drained by the Patuxent and Potomac rivers, the latter separating it from the District of Columbia on the w.; traversed by the Baltimore and Ohio and the Baltimore and Potomac railroads; 500 sq.m.; pop. '80, 26,263—25,705 of American birth; 12,313 colored. Tobacco, corn, and wheat are the chief products; the annual yield of tobacco is about 4,000,000 lbs. There are important shad and oyster fisheries. Iron ore is found. Co. seat, Upper Marlborough.

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PRINCE OF WALES, the title borne by the eldest son of the sovereign of England. The native sovereigns of Wales were so designated in the days of Welsh independence; and on the conquest of Wales, the principality of Wales and earldom of Chester were bestowed by Henry III. on his son, afterward Edward I., but as an office of trust and government rather than as a title. It is traditionally related that Edward I. engaged to give the Welsh people a prince who would be born among them, and not know a word of English, and fulfilled the promise by bestowing the principality on his infant son, Edward, b. at Caernarvon castle. Edward, by the death of his elder brother, became heir-apparent. Edward III., his son, was never prince of Wales; but in 1343 he invested his son, Edward the black prince, with the principality, and from that time the title of prince of Wales has been borne by the eldest son of the reigning king. The title is, however, not inherited, and has usually been bestowed by patent and investiture, though in a few instances the heir to the throne has become prince of Wales simply by being so declared. The eldest son of the sovereign is by inheritance duke of Cornwall, a title first conferred in 1337 on Edward the black prince, on the death of his uncle, John of Eltham, the last earl of Cornwall, and held, according to the terms of the grant, by the first begotten son of the king. The title of earl of Chester, borne by Edward III. before his accession to the throne, has since been given along with the principality of Wales. That earldom was, by 21 Richard II. c. 9, erected into a principality; and it was enacted that it should be given in future to the king's eldest son—a precedent which has since been followed, although that statute, along with all others in the same parliament, was repealed by 1 Henry IV. c. 3. On the death of a prince of Wales in his father's lifetime, the title has been conferred on the sovereign's grandson, or next younger son, being heir-apparent. As heir of the crown of Scotland, the eldest son of the sovereign is prince and high steward of Scotland, duke of Rothsay, earl of Carrick, baron of Renfrew, and lord of the isles. The high office held by the house of Stewart (see STEWART, HOUSE OF) became merged in the crown when Robert II., the representative of the family, ascended the throne of Scotland in 1371. The earldom of Carrick was conferred by Robert II. on his eldest son. The dukedom of Rothesay was created by a solemn council held at Scone in 1398, and conferred on David, eldest son and heir of Robert III.; and when David, in 1402, fell a victim to the ambition of his uncle, it was transferred to his brother James, afterward James I. of Scotland. Renfrew was the chief patrimony of the stewards of Scotland, to whom it was granted by the sovereign in the 12th c., their principal residence having been in the burgh of Renfrew. In 1404 king Robert III. granted the barony of Renfrew and other portions of the estates of the stewards to his son and heir, James, since which time the eldest son of the sovereign has borne the title of baron of Renfrew. By act of the Scottish parliament of 1469, the titles of prince and high steward of Scotland, duke of Rothesay, earl of Carrick, baron of Renfrew, and lord of the isles were vested in the eldest son and heir-apparent of the crown of Scotland forever. The present prince of Wales was created earl of Dublin on Sep. 10, 1849, that dignity being destined to him and his heirs, kings of the United Kingdom of Great Britain and Ireland, forever.

An annuity of £40,000 was settled on the prince of Wales by 26 Vict. c. 1. He has besides the revenues of the duchy of Cornwall. These amounted previously to 1840 to between £11,000 and £16,000; since that period they have greatly risen, amounting in 1876 to £99,827. Only a small part of this income has been expended since the birth of the present prince of Wales. The sum paid over to the present prince of Wales in 1868 was £55,252; and in 1876, £70,375. An income of $10,000 has been settled by parliament on the princess of Wales, to be raised to £30,000 in the event of her widowhood. The annuities of the prince and princess of Wales are charged on the consolidated fund.

The prince of Wales has a separate household, as also has the princess of Wales. Act 35, Geo. III. c. 125 makes provision to prevent the accumulation of debt by any future heir-apparent to the crown, and enacts that as soon as he shall have a separate establishment, the treasurer or principal officer shall make a plan of such establishment in distinct departments and classes, with the salaries and payments of each class, and of each individual officer; and the treasurer is made responsible for the punctuality of all payments, and required to submit his accounts to the lords of the treasury. The statute of treasons, 25 Edw. III. makes it treason to compass the death of the prince of Wales, or violate the chastity of his consort.

By a statute of the order of the garter, of date 1805, the prince of Wales becomes a knight of the Garter as soon as he receives that title.

In 1788, on the illness of George III., it was made a question whether the prince of Wales was not, as heir-apparent, entitled to the regency; the recovery of the king prevented the necessity for a decision, but it is now held that he has no such right.

The arms of the prince of Wales are those of the sovereign, differenced by a label of three points argent, and the present prince of Wales bears *en surtout* the escutcheon of the house of Saxony. The supporters and crest are the same as those of royalty. The ancient coronet of the princes of Wales was a circle of gold set round with four crosses patée, and as many fleurs-de-lis alternately. Since the restoration, it has been closed with one arch only, adorned with pearls, surmounted by a mound and cross, and furnished with a cap trimmed with ermine, like that of the sovereign. The prince of

Wales has further a distinguishing badge, composed of a plume of three white ostrich feathers, encircled by an ancient coronet of a prince of Wales, and accompanied by the motto "Ich dien" (I serve). This device is said by a tradition, on which considerable doubts have been thrown, to have been first assumed by the Black prince after the battle of Crécy, in 1346, when he took such a plume from John, king of Bohemia, whom he had slain with his own hand. The motto has been supposed to allude to the fact that the king of Bohemia served, or was stipendiary to the French king in his wars.

PRINCE OF WALES ISLAND, or PU'LO PINANG' (Betel Nut island), an important British possession, and one of the straits settlements (q v.), lies at the mouth of the strait of Malacca, near the w. coast of the Malay peninsula, in lat. 5° 16'—5° 30' n., and long. 100° 9'—100° 25' east. Length 18¼ m.; breadth, 5 to 10 m.; area, 106 sq. miles. A belt of cocoa-nut and lofty areca palms runs along the coast. A slip of low land, interspersed with hills, stretches along the e. side of the island, where rice, pepper, betel, fruits, provisions, etc., are planted on the level parts; nutmeg and clove-trees on the heights. This district is watered by numerous streams, cut by well-kept roads, and dotted with villas and gardens. Sugar, coffee, and pepper plantations are on the s. and s.w. coasts; thence rises a wooded mountain ridge, which increases in elevation toward the n., where, at the sanitarium bungalows of Strawberry hill, it attains a height of 2,922 feet. The rocks are granite and mica schist; the soil, a rich vegetable mold.

The climate of Prince of Wales island is healthy, a sea-breeze blowing every day, and rain falling during all the months of the year, except January and February. In the low lands, the thermometer ranges from 80° to 90°, and at Strawberry hill, from 62° to 75°, affording a pleasant change within a few miles of Georgetown. From the sanitarium, a splendid view is obtained of the plantations, town, shipping, and the lofty hills of Queda.

The products are timber, pepper, sugar, nutmegs, cloves, coffee, cocoa, and areca nuts, ginger, sweet potatoes, rice, etc.; and the pineapple, shaddock, plantain, banana, orange, lemon, mango, guava, etc., abound. The attempt to grow cotton has proved a failure. Tin ore is found at the base of the mountains. The imports may be valued at about £1,600,000; the exports at £2,000,000. European and American manufactures, and a share of the produce of the eastern Archipelago, China, India, Siam, and Burmah, enter the emporium of Prince of Wales island on their way to suitable markets.

Georgetown, the capital, is situated at the n.e. extremity of the island, and is defended by fort Cornwallis. The governor's house and the hospital are at some distance from the town, which is the seat of government for the Eastern straits settlements, including Malacca and Singapore. On the peninsula opposite lies the province of Wellesley, a strip of country 35 m. in length by 4 to 11 m. in breadth. The population of Prince of Wales island, in 1871, was 61,797, and along with that of the province of Wellesley, 133,230; of whom the greater number are Malays, many are Chinese, 400 or 500 are Europeans and their descendants; the remainder being Siamese, Burmans, Bengalese, etc.

Toward the end of last century, a capt. F. Light married the daughter of the king of Queda, from whom he received the gift of Prince of Wales island; but in 1786 it was handed over to the East India company, who retained capt. Light as superintendent, and paid the king $6,000 annually. By an arrangement to pay an additional $4,000 yearly, the province of Wellesley was afterward ceded to the company. Population rapidly increased, the forests were cleared for plantations, and a large trade sprang up. It has been nearly stationary for several years, except in agriculture, owing to the more favorable situation of Singapore for the general commerce of these seas.

PRINCEPS SENATUS, an officer of the Roman senate, who, under the monarchy, was a royal appointee for life, *custos urbis*, and had precedence among the *decemviri*. Under the republic he was the appointee of the curies, B.C. 487, the *patres minorum gentium*, previously ineligible, were made eligible, and afterward the senior ex-censor held the office *ex officio*. Later, any senator was eligible, but the office was simply honorary, and did not carry with it the presidency of the senate. Finally the title belonged to the emperor.

PRINCE RUPERT'S DROPS. These scientific toys, so called from prince Rupert (see RUPERT), their inventor, are simply drops of glass thrown, when melted, into water, and thus suddenly consolidated. They have usually a form somewhat resembling a tadpole. The thick end may be subjected to smart hammering on an anvil without its breaking; but if the smallest fragment of the tail be nipped off, the whole flies into fine dust with almost explosive violence. The phenomenon is due to the state of strain in the interior of the mass of glass, caused by the sudden consolidation of the crust. The crust is formed while the internal mass is still liquid. This tends to contract on cooling, but is prevented by the molecular forces which attach it to the crust. It is, therefore, somewhat in the state of the dog-head of a gun on full-cock, which will stand a smart blow without falling; while a slight touch applied to the trigger allows the spring to act. Another example of the same state of constraint is the Bologna phial—a glass cup with its sides thin, but the bottom very thick. It also is cooled as quickly as possible. A bullet may be dropped into it with safety from a considerable height; but if a small, sharp-edged fragment of flint be dropped in, so as to scratch the surface in the slightest degree, the molecular forces are set free, and the whole falls to pieces.

PRINCE'S FEATHER. See AMARANTH, *ante.*

PRINCE METAL. See TIN.

PRINCESS ANNE, a co. in s.e. Virginia, bounded on the n. by Chesapeake bay, on the e. by the Atlantic ocean; about 350 sq.m.; pop. '80, 9,394—9,361 of American birth, 4,265 colored. The surface is level and heavily timbered. The soil is fertile. The principal productions are corn, cattle, and lumber. Co. seat, Princess Anne Court-House.

PRINCETON, a t., the co. seat of Bureau co. Ill., on the Chicago, Burlington and Quincy railroad; 105 m. w.s.w of Chicago; pop. '70, 6,500. It has churches, schools, 3 banks, 3 newspapers, a court-house, and several manufactories. It is one of the earliest settled towns in the state, and has always had the repute of being a place of social culture and a pleasant residence.

PRINCETON, a t. and township of New Jersey, on a branch of the Pennsylvania railway, 40 m. n.e. of Philadelphia. It is pleasantly situated, and contains many elegant residences; has a bank, a weekly newspaper, and several churches. The pop. of Princeton in 1870 was 3,986. On Jan. 3, 1777, it was the scene of a battle between the British under col. Mawhood, and the Americans under Washington, in which the former were defeated. Princeton, however, is chiefly celebrated as the seat of the college of New Jersey, popularly known as Princeton college, founded by charter in 1746, under the auspices of the Presbyterian synod of New York, and transferred from Newark to Princeton in 1757, on the erection of a hall named Nassau hall in honor of William III. The college of New Jersey has had several distinguished Presbyterian divines for its presidents, as Jonathan Edwards, Aaron Burr, and Dr. McCosh. In 1874-75 it had 14 professors, 6 instructors, and 408 students. The theological seminary, founded in 1812, has 6 professors, 1 tutor, and 116 students. With the Princeton theological school is associated the fame of the *Biblical Repertory and Princeton Review*, founded in 1825, and for many years edited by Dr. Hodge, professor in the theological seminary. The *Princeton Review* is now, however, edited in New York.

PRINCETON, BATTLE OF, Jan. 3, 1777. Cornwallis, with nearly his whole force, came up from Princeton to Trenton, where the American army was stationed, Jan. 2, and took up his position on the w. bank of the Assanpink, a little fordable stream, the bridge across which was commanded by the Americans. Washington, whose army was inferior in every way to that of the enemy, and whose retreat was impossible on account of the ice in the Delaware, resolved to attack the remaining British force at Princeton, capture the arms and stores at that point, and seize the British magazines at Brunswick afterward. Washington came to the bridge on Stony Brook, about 3 m. from Princeton, at sunrise, sent on gen. Mercer to take possession of the bridge on the main road to Princeton, and went himself by a shorter way. Meanwhile he had kept the enemy in ignorance of his movements; his baggage had been carried to Burlington, and a force had been left at the Assanpink to deceive the enemy with a show of defense, but with orders to join the main body of the army at dawn. The British force at Princeton, on their way to Trenton, encountered Mercer's brigade at the bridge. Both detachments endeavored to take possession of the same position on a piece of rising ground, which the Americans succeeded in occupying first. The Americans began a vigorous fire upon the British, who soon made a bayonet charge, and drove them from their position. During the fight, gen. Mercer was mortally wounded. The British pursued the Americans, but were soon stopped by a force of Pennsylvania militia under Washington, and a body of American regulars. The British began an artillery fire on this force, and made a determined attempt to capture two pieces of artillery from the militia; and after a fierce struggle, by another bayonet charge, succeeded in reaching the main road, and started toward Trenton, leaving two field-pieces on the field. The 55th British was put to flight, and went in the direction of Brunswick. The 40th did not arrive in time to take part in the battle; part found shelter in Nassau hall at the college of New Jersey, part retreated to Brunswick. The few who did not escape when the Americans came up, surrendered after exchanging a few shots. Washington marched to Morristown. The British loss was nearly 200 killed and wounded, and 230 prisoners. The American loss was about 37.

PRINCETON COLLEGE. See NEW JERSEY, COLLEGE OF.

PRINCE WILLIAM, a co. in n.e. Virginia, drained by the Potomac on the s.e., and by Bull run and Occoquan river, and traversed by the Virginia Midland railroad; 300 sq.m.; pop, '80, 9,180—8,954 of American birth, 2,601 colored. The surface is hilly; corn, wheat, oats, and pork are the staples. Co. seat, Brentsville.

PRINCIPAL, the name given to an important stop of the organ. It is sometimes termed the octave stop, because it is tuned one octave above the diapasons. It stands midway in pitch between the diapasons and the fifteenth; and in tuning an organ it is, owing to its clearness of tone, the best stop to commence with for the adjustment of other stops: probably from this fact it derives its name.

PRINCIPAL AND ACCESSORY. See ACCESSARY.

PRINCIPAL AND AGENT. The law of principal and agent is founded on the absolute necessity of having some one to act for another in times and places when the latter is not personally present, and this necessity pervades nearly all branches of the law; and as a general rule, the act of the agent is just as binding on the principal, and produces the same effect, as regards his liability, as if the principal had acted in person. Agents are divided into many classes; indeed, nobody can escape, in one capacity or another, being occasionally the agent of somebody else. Attorneys, solicitors, advocates, brokers, auctioneers, etc., may be said to make a business of agency. A wife is, in law, for many purposes of household management, the agent of the husband, and so are the children. Mercantile agents are generally called factors or brokers. The contract between principal and agent implies that the agent shall keep within the limits of his commission, and that the principal will ratify and accept all his contracts, and relieve him of his liabilities. The remuneration of the agent is generally called his commission. As the agent binds his principal, it follows that the principal can be sued by third parties who deal with the agent. The nice distinction that exists in the law on this subject as to the mutual rights and liabilities of the parties are too numerous to be here noticed.

PRINCIPAL AND SURETY. See SURETY.

PRINCIPA'TO, CITRA and ULTRA, formerly the name of two provinces of the kingdom of Naples. *Principato Citra,* now forming the province of Salerno in the reorganized kingdom of Italy, is a maritime province, bounded on the s.w. by the Mediterranean, and on the n. by the province of *Principato Ultra,* now called Avellino. The united area of the two provinces is 3,405 sq.m.; pop. '71, 917,429. Principal towns in Principato Citra are Salerno (from which it derives its present name), Sarno, and Pagani; in Principato Ultra, Avellino (from which it takes its present name), Ariano, and Cervinara.

PRIN'GLE, THOMAS, 1789–1834; b. at Blaiklaw, Scotland; educated at the university of Edinburgh. While a clerk in the register's office he published a poem entitled *The Autumnal Excursion.* Abandoning his clerkship in 1817, he devoted himself to literary pursuits, and commenced the *Edinburgh Magazine,* which was soon changed to *Blackwood's Magazine.* At the same time he edited the *Edinburgh Star* newspaper, and *Constable's Magazine,* and published a volume entitled *The Excursion and other Poems.* In 1820 he went with his brothers, who were farmers, and 23 others to South Africa, and became government librarian at Cape Town. He endeavored to eke out his income by establishing an academy, started the *South African Journal,* and edited the *South African Commercial Advertiser.* The intolerance of the governor compelled him to discontinue these, and in 1826 he returned to England, where in 1827 he became secretary to the anti-slavery society, holding the office until the abolition of slavery in the West Indies in 1834. His published works are *Some Account of English Settlers in Albany, South Africa; Ephemerides, or Occasional Poems; Teviotdale and other Poems; African Sketches; Narrative of a Residence in South Africa.* An edition of his *Poetical Works,* with a sketch of his life, by Leitch Ritchie, appeared in 1838.

PRINGS'HEIM, NATHANAEL, b. Landsburg, Silesia, 1823; studied botany in Paris and went to Berlin in 1851. In 1854 he published *Grundlinien einer Theorie der Pflanzenzelle;* 1855, *Ueber die Befruchtung und Keimung der Algen und das Wesen des Zeugungsactes.* In 1857 he began the publication of the *Jahrbücher für Wessenschaftliche Botanik.* In 1864–68 was professor at the university of Jena. He is the author of several important works; among them are *Ueber die Befruchtung und Keimung der Algen und das Wesen des Zeugungsactes,* in 1855, and *Grundlinien einer Theorie der Pflanzenzelle,* 1854. He is distinguished for valuable researches regarding cryptogamous plants.

PRINTERS, LAW AS TO. There were various restrictions on the sale and use of printing-presses, which had been imposed in consequence of the extended and secret influence often exercised by them; and the law of treason and libel is intimately associated with the press. By an act of 32 and 33 Vict. c. 24, which altered several older acts passed in the reign of George III. for suppressing seditious and treasonable practices, reciting the mischief produced by the publication of irreligious, treasonable, and seditious libels, and the difficulty of tracing them, it is not now law that every person having a printing-press, or types for printing, shall give notice thereof to the clerk of the peace where the same is intended to be used, and shall obtain a certificate of registration, otherwise he is liable to a penalty of £20. And the queen's printers for England and Scotland, and the university presses of Oxford and Cambridge, were exempt. No letter-founders and makers of types need register themselves under a like penalty, and need not keep an account of all the persons to whom types and presses are sold, which account may be inspected by a justice of the peace. But printers must keep a copy of every paper they print for hire or reward, and shall indorse thereon the name of the person employing them to do so, under a penalty of £20. Every printer who shall print a book or paper without having the printer's name and address on the first or last leaf thereof, shall, by the act 32 and 33 Vict. c. 24, forfeit £5 for every copy printed; but the only person who can sue for or enforce this penalty is the attorney or solicitor general of England, or the lord-advocate of Scotland. And any proceedings to enforce the statutes in the name of other persons are absolutely void. The law is thus changed that a printer cannot recover his expenses for labor and materials in printing a work, unless he has complied with the statutory requirements. On a recent occasion, in which a printer in England who sued for his account was met with a defense founded on these statutes, it was discovered by the London printers that few of them had registered themselves; and such law is now repealed altogether. With regard to the printing trade, many customs prevail which do not differ in point of law from the customs affecting other trades, it being the rule that customs of a peculiar trade are binding unless specially excluded. As to obscene prints, see OBSCENE.

PRINTING is the art of producing impressions from characters or figures, on paper or any other substance. There are several distinct branches of this important art—as the printing of books with movable types, the printing of engraved copper and steel plates (see ENGRAVING), and the taking of impressions from stone, called lithography (q.v.). We have now to describe the art of printing books or sheets with movable types, generally called *letter-press printing*, and which may undoubtedly be esteemed the greatest of all human inventions.

The art of printing is of comparatively modern origin, only 400 years having elapsed since the first book was issued from the press; yet we have proofs that the principles upon which it was ultimately developed existed among the ancient Assyrian nations. Entire and undecayed bricks of the famed city and tower of Babylon have been found stamped with various symbolical figures and hieroglyphic characters. In this, however, as in every similar relic of antiquity, the object which stamped the figures was in one block or piece, and therefore could be employed only for one distinct subject. This, though a kind of printing, was totally useless for the propagation of literature, on account both of its expensiveness and tediousness. The Chinese are the only existing people who still pursue this rude mode of printing by stamping paper with blocks of wood. The work which they intend to be printed is, in the first place, carefully written upon sheets of thin transparent paper; each of these sheets is glued, with the face downward, upon a thin tablet of hard wood; and the engraver then, with proper instruments, cuts away the wood in all those parts on which nothing is traced; thus leaving the transcribed characters in *relief*, and ready for printing. In this way, as many tablets are necessary as there are written pages. No press is used; but when the ink is laid on, and the paper carefully placed above it, a brush is passed over with the proper degree of pressure. A similar kind of printing by blocks, for the production of playing-cards and rude pictures of scriptural subjects, was in use in Europe toward the end of the 14th century. But in all this there was little merit. The great discovery was that of forming every letter or character of the alphabet separately, so as to be capable of rearrangment, and forming in succession the pages of a work, thereby avoiding the interminable labor of cutting new blocks of types for every page. The credit of discovering this simple yet marvelous art is contested by the Dutch in favor of Laurence Coster (q.v.), between 1420 and 1426; and by the Germans, on behalf of Johann Gänsfleisch of the Gutenberg (q.v.) family, about 1438. In all probability, the discovery was made almost simultaneously—such a theory being consistent with the general social progress at the period, and the secrecy which both inventors at first maintained respecting their art. The types first employed were of wood; but soon the practice of casting them in metal was introduced. See TYPES. The earliest of these metal types resembled the black letter in use by transcribers, and one great aim of the first printers was to produce books which should closely resemble the works in manuscript hitherto in use. Between 1450 and 1455 Gutenberg succeeded in printing a Bible, copies of which are now exceedingly rare and valuable. It is in quarto size, double columns, the initial letters of the chapters being executed with the pen, in colors. Besides this Bible, some other specimens of the work of Gutenberg, the produce of his press at Mayence, have been discovered. The Dutch at Haarlem preserve and show with reverential care similar specimens of early printing by Coster. Mayence, Strasburg, and Haarlem were indisputably the places where printing was executed before the art was extended to Rome, Venice, Florence, Milan, Paris, Tours, and other continental cities. Previous to 1471 it had reached these and various other places; and about the same year Caxton (q.v.) introduced the art into England by setting up a press in Westminster abbey.

Printing was introduced into Scotland about 30 years after Caxton had brought it to England; in 1551 it reached Dublin, and to other quarters it found its way very slowly. While coming into notice, its progress had been interrupted by the broils consequent on the reformation; and soon afterward it was retarded by the civil war in Great Britain. Even the restoration acted detrimentally, for it led to an act of parliament which prevented more than 20 printers carrying on their art in England. Printing, in short, has in almost every country been an ill-used art; and is still in various countries practiced under fiscal restrictions. In Germany and Holland, where it originated, it has, on account of sundry obstructions, gained little way—the work produced at Mayence and Haarlem being, for example, still of a very inferior kind; while, in recent times, in England and the United States, the art has attained to extraordinary proficiency. Printing is now conducted in all the British colonial possessions; but in few is the work of a superior character—the best perhaps being that produced at Melbourne in Victoria.

Retarded by the jealousy of governments, printing for some ages derived little advantage from mechanical ingenuity. Originating at the middle of the 15th, the art continued to be conducted until the middle of the 17th c. in a very clumsy manner. The press resembled a screw-press, with a contrivance for running the form of types under the point of pressure; force having been thus applied, the screw was relaxed, and the form withdrawn with the impression executed on the paper. The defects of this very rude mechanism were at length partially remedied by an ingenious Dutch mechanic, Willem Jansen Blaeu, who carried on the business of a mathematical instrument-maker at Amsterdam. He contrived a press, in which the carriage holding the form was wound below the point of pressure, which was given by moving a handle attached to a screw hanging in a beam having a spring, which spring caused the screw to fly back as soon as the impression was given. This species of press, which was almost entirely formed of wood, continued in general use in every country in Europe till the beginning of the present century. With certain lever powers attached to the screw and handle, it is represented above.

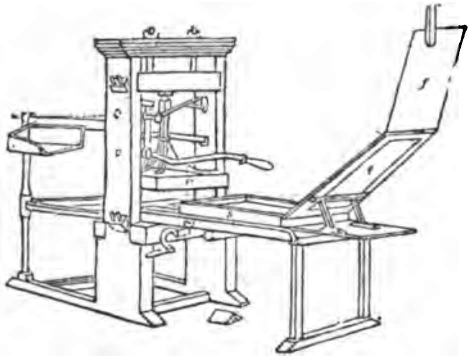

Fig. 1.—Old Common Press.

In connection with this representation of the old common press, the process of printing may be described. The form, being laid on the sole of the press (*s*), is fixed at the sides, so as to render it immovable from its position. There are two men employed; one puts ink on the form, either by means of stuffed balls or by a composition-roller, and the other works the press. The latter lifts a blank sheet from a table at his side, and places it on what is called the *tympan* (*t*), which is composed of parchment and blanket-stuff, fitted in a frame, and tightened like the top of a drum—and hence its name—and which, by means of hinges connecting it with the sole, folds down like a lid over the form. As the sheet, however, would fall off in the act of being brought down, a skeleton-like slender frame, called a *frisket* (*f*), is hinged to the upper extremity of the tympan, over which it is brought to hold on the paper. Thus, the frisket being first folded down over the tympan, and the tympan next folded down over the form, the impression is ready to be taken. This is done by the left hand of the pressman winding the carriage below the *platten* (*p*), or pressing surface, and the impression is performed by the right hand pulling the handle attached to the screw mechanism. The carriage is then wound back, the printed sheet lifted off, and another put on the tympan, the form again inked, and so on successively. In the above engraving, the press appears with the frisket and tympan sloping upward, ready to receive the sheet, the frisket being sustained from falling backward by a slip of wood depending from the ceiling. One of the greatest niceties connected with this art is the printing of the sheet on the second side in such a manner that each page, nay, each line, shall fall exactly on the corresponding page and line on the side first printed. To produce this desirable effect, two iron points are fixed in the middle of the sides of the frame of the tympan, which make two small holes in the sheet during the first pressure. When the sheet is laid on to receive an impression from the second form, these holes are placed on the same points, so as to cause the two impressions to correspond. This is termed producing *register;* and unless good register is effected, the printing has a very indifferent appearance. However improved, a press of the above description could not impress more than half a sheet; and the practice was to first squeeze so much of the sheet, then relax the handle, wind the second half below the platten, and print it in turn. Thus, each sheet required four squeezes to complete it—two on each side. It is not without a degree of wonder that one reflects on the rudimentary clumsiness of the whole operation; and it seems not less marvelous, that it was by no other process that the best typography could be produced until the conclusion of the 18th century.

The first improvement upon the printing-press was made by the celebrated earl of Stanhope. He constructed the press of iron, and that of a size sufficient to print the whole surface of a sheet, and he applied such a combined action of levers to the screw as to make the pull a great deal less laborious to the pressman, the mechanism altogether being such as to permit much more rapid and efficient working. A multitude of improvements speedily succeeded that of earl Stanhope, in most of which the screw was dismissed, the pressure being generally effected by levers, or by the simple and efficient principle of straightening a joint. Among those which have gained a large share of approbation may be mentioned the *Columbian press*, which is of American invention. This press was brought to Great Britain in 1818 by Mr. George Clymer of Philadelphia, and patented. The pressing-power in this instance is procured by a long bar or handle acting upon a combination of exceedingly powerful levers above the platten, the return of the handle or levers being effected by means of counterpoises or weights. For ease and facility of *pull*, this press is preferred by most workmen; and certainly the powerful command which the leverage enables the workman to exercise, is favorable to delicacy and exactness of printing—his arm feeling, as it were, through the series of levers to the very face of the types. In the present day, the old wooden press of Blaeu is entirely discarded from use.

To secure good printing, the following points are essential: 1. The types, carefully set, fixed with precision in forms, rendered level all over, so that all parts may be pressed alike, and the whole properly cleaned by a wash of potash lye. 2. A uniform inking of the surface, to give uniformity of color. 3. The paper damped equably, neither too much nor too little, so as to take an impression easily and evenly. 4. An equable, firm, and smart pressure, and with that degree of steadiness in the mechanism that the sheet shall touch and leave the types without shaking and blurring. 5. Care in adjusting the pointers (or gauge), so that perfect register may be secured in printing the second side. 6. Such frequency in changing *fly* or under-sheets on the tympan, that the first side shall not get dirtied by off-setting when printing the second side. 7. The laying of small patches on the tympan, where, from any inequality, it seems necessary to bring up the pressing surface to a thorough equality. A regard to all these circumstances constitutes the duty of a pressman. Bad printing is usually a result of old and worn types, want of proper cleaning, and an inferior kind of ink.

Printing by hand-presses of an improved kind continues to be used in the case of limited impressions, or where extra care and elegance in typography are required; also where machinery is unattainable; but in general circumstances, and more particularly to meet the demand for popular reading, printing is now executed by one or other of the varieties of cylinder-presses, moved by steam-power. Attempts have indeed been made to introduce flat-pressure machines, by which as many as 700 sides can be printed per hour; but these, though possessing the advantage of superseding severe bodily labor, and demanding only the services of a boy to lay on, and another to take off the sheets, have never become common. More success, as regards flat-pressure machines, has been attained in the United States, where much fine work is provided by a clever adaptation of this kind, particularly in New York, Boston, and Philadelphia. No flat pressure, however, can compete, in point of speed, with the pressure which is communicated by revolving iron cylinders.

Cylinder-printing is the great modern fact in the history of the art, progress in which department has been facilitated by the invention of inking rollers made of a certain composition, to supersede the old process of inking by stuffed balls (see ROLLERS). In 1790, Mr. Nicholson, the editor of the *Philosophical Journal*, procured a patent for certain improvements in printing, which patent embodies almost every principle since so successfully applied to printing-machines; and although he did not carry his views into practical effect, little has been left for subsequent engineers to do, but to apply, in the most judicious manner, the principles he laid down in his patent. Whether Mr. Nicholson's ideas were known to Mr. König, a German, is now uncertain; but to him is due the distinguished merit of carrying steam-printing first into effect. Arriving in London about 1804, he first projected improvements on the common press; but, after a while, he turned his attention to cylinder-printing. The first result of his experiments was a small machine, in which the two leading features of Nicholson's invention were embraced (the cylinders and the inking-rollers), which he exhibited to Mr. Walter, proprietor of the *Times* newspaper; and on showing what further improvements were contemplated, an agreement was entered into for the erection of two machines for printing that journal. Accordingly, on Nov. 28, 1814, the public were apprised that the number of the *Times* of that date was the first ever printed by machinery, steam-propelled. At this period, but few persons knew of any attempts going on for the attainment of this object; whilst among those connected with printing, it had often been talked of, but treated as chimerical.

After the utility of cylindrical printing had been thus proved, it was thought highly desirable that the principle should be applied to printing fine book-work, where accurate register is indispensable. This was, to a certain extent, attained by using two large cylinders, the sheet of paper being conveyed from the bottom of the first cylinder (where it had received the first impression) by means of tapes, leading in a diagonal direction to the top of the second cylinder, round which the sheet was carried till the second side was printed. The first machine of this description was erected at Mr. Bensley's office, where it continued at work for some years, till more modern machines superseded it.

In the course of 1818 Messrs. Applegath and Cowper took out a patent for improvements in cylindrical printing-machinery. The chief improvements were the application of two drums placed between the cylinders to insure accuracy in the register, over and under which the sheet was conveyed in its progress from one cylinder to the other, instead of being carried, as in König's machine, in a straight line from the one cylinder to the other; and the mode of distributing the ink upon tables instead of rollers—two principles which have secured to machines of this construction a decided preference for fine work. Machines of this construction were made by Applegath and Cowper for the principal printing establishments in London, Paris, Edinburgh, and many other cities: and it is nearly upon the model of their machines that other manufacturers now construct their steam-presses for the execution of ordinary book-work. Printing-machines may be divided into two distinct classes—those for printing book-work, in which register is required, and those for printing newspapers, in which register is not sought for, and speed is of first consequence.

Applegath and Cowper's book-machine, as just mentioned, remains the best of its kind. The machine, moved by steam-power, from which the annexed engraving is taken, is one of this description. It is about 15 ft. long by 5 broad, and consists of a very strong cast-iron frame-work, secured together by two ends and several cross-bars. To this frame all parts of the machine are fixed. In external figure, as seen in the cut, it is a large apparatus of imposing appearance. On approaching it when at work, we perceive two cylinders, as large as hogsheads, revolving on upright supports; two smaller cylinders or drums revolving above them; and beneath, within the frame-work, a table, on which lie the types at both ends, going constantly backward and forward. A belt from a steam-engine, acting upon a shaft in the frame, gives motion to the whole apparatus. It will further be observed that a boy, marked *a* in the cut, is standing on the top of some steps feeding in sheets of paper, each of which, on being delivered, is swept round the first cylinder *b* (being held on by tapes), gets its impression below from the types, is carried over and betwixt the drums above, and then brought round on the second cylinder *c*; now it gets its second side printed, and issuing into the space between the cylinders, is seized by the boy *d*, who lays it on a table completely printed. The whole operation is accompanied with a loud noise, from the revolving of the cylinders, the working of the notched wheels, and the driving of the table to and fro by a rack beneath, but without any strain on the mechanism, or risk of injury to the attendants. On minutely examining the parts, we observe that at each end there is an apparatus of rollers taking ink from a ductor or reservoir of that material, and placing it upon a portion of the moving table beneath; here other rollers distribute it, while others take it off and roll it upon the pages of types, ready for each impression.

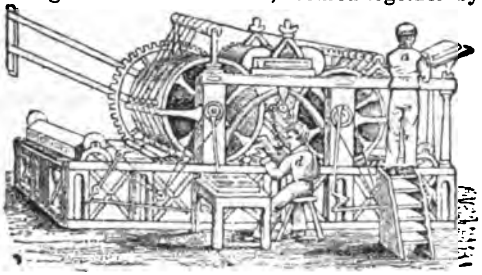

FIG. 2.—Book Machine.

The two printing-cylinders are nearly nine feet in circumference each, and are placed about two feet apart. They are accurately turned, so that the surfaces of the type-carriages and the cylinders may be perfectly parallel. The axis of each cylinder works in brass bearings in the upright frame-work, where, by means of screws, the degree of pressure with which the cylinders are allowed to rest upon the types may be regulated to any degree of nicety.

The cylinders have a continuous rotary motion toward each other, given by two large toothed wheels, whilst the type-carriages move backward and forward under them. The movements are so contrived that the type-carriages shall have gone and returned to the same point during the period that the cylinders have made one entire revolution; consequently, each successive impression is taken from the types by the same part of each cylinder. The two drums placed between the cylinders are for the purpose of causing the sheet of paper to pass smoothly and accurately from one printing cylinder to the other. To preserve the sheet in its proper place on the cylinders, and carry it forward through the different parts of its journey from the hand of the one boy to that of the other, there is an extensive apparatus of tapes, some of which are observable in the cut. These tapes are half an inch broad, and are formed into a series of endless bands, arranged at certain distances apart, so as to fall into the interstices and margins of the forms, and therefore escape being crushed between the types and the cylinders. The machine may be stopped at any instant by turning the handle of a lever. Such is the form of the machine that has printed the present work.

Many modified varieties of the cylinder machine have been introduced; the most important of them is the *gripper*. In this machine the types are laid on a traveling table like that described above; the cylinder which gives the pressure is reduced to 12 or 18 inches in diameter, the drums are dispensed with, and the tapes are replaced by a contrivance called a gripper. This consists of a series of brass grips like fingers arranged along, and fixed to the cylinder; these seize the sheet at the proper moment, and retain it till it is delivered printed. The single gripper is supplied with points for registering. In the double or perfecting variety, the sheet is delivered from the first cylinder into the grippers of the second. There are many varieties of gripper machines; the most popular are the Wharfdale, a single, and the double gripper, named after its maker, M. Marinoni of Paris. They produce good work, and are well adapted for general purposes.

Non-registering machines for rapid printing are of various kinds, according to the degree of speed which is demanded. In those first introduced, the principle was that of pressure by a cylinder on a form of types laid upon a table, which was passed beneath it by a forward and retrograde motion; the inking being effected as in the above described perfecting machines. Having received one side by this means, the sheets were afterward printed on the second side; such second impression containing the news up till the latest hour of going to press. This species of single cylinder printing-machine was well adapted for newspapers of which only a few thousand copies were wanted; and for this purpose it is still in use, particularly in provincial towns in Great Britain. As presses of this sort, however, do not usually yield more than 4,000 or 5,000 impressions per hour, they are quite unfitted for printing newspapers having a circulation of 20,000 copies and upward, the whole of which must be promptly produced by a certain hour every morning. The liberation of newspapers from the obligatory penny-stamp in 1855 caused so great an increase of circulation that none of the ordinary processes, including that just referred to, was at all adequate for the work required. Recourse had to be made to an entirely new method of printing, the invention of which is due to Richard M. Hoe of New York.

Hoe's process consisted in placing the types (for which stereotype plates were afterward substituted) on a horizontal cylinder revolving on its axis, against which the sheets were pressed by exterior and smaller cylinders. The pages of type were arranged in segments of a circle, each segment forming a frame that could be fixed on the cylinder. These frames were technically called *turtles*. By the ingenious contrivance of making the brass rules that separate the columns of a beveled or wedge shape, the thinner edge being toward the surface of the turtle, the form of type was susceptible of being tightened up and made firm. The forms occupied only a portion of the main cylinder, the remainder affording space for the inking apparatus. The smaller surrounding cylinders for effecting the pressure were arranged in a frame-work, in connection with slopes, by which the sheets were fed in blank, and came out printed on one side. The size of the main cylinder, the number of exterior cylinders, and the rate of speed determined the number of impressions printed per hour. Such was the method of working Hoe's rotary machines, which, as wanted, were made with 2, 4, 6, 8, or 10 subsidiary cylinders. The first introduced into Europe (with the exception of one made for the Paris newspaper, *La Patrie*, in 1848) was one with six cylinders for printing *Lloyd's Weekly Newspaper* in London in 1857. Some idea of the process of working may be obtained from Fig. 3, representing a rotary machine with six feeders. Such a machine with its six feeders, each laying in sheets at the rate of 2,000 per hour, could deliver 12,000 impressions in the hour; and those with 8 and 10 cylinders in proportion.

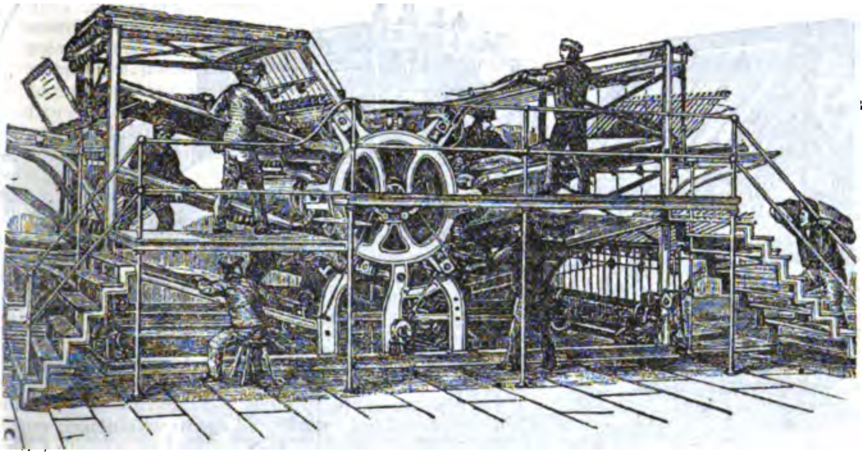

FIG. 3.

About the time that the Hoe machines came commonly into use, another great advance was made in the art of rapid printing. In 1859 a long series of experiments ended in the successful substitution of curved stereotype plates for pages of movable type. Besides escaping the risk and wear involved in working pages of type in circular chases, the new method relieves the types from all direct printing-work, so that the fount instead of two years may last twenty.

The Hoe machine, however, with all its advantages, retained the inconvenience of printing only one side at a time, and the multiplication of the feeding cylinders introduced too many complications. These difficulties have been entirely overcome by a new machine, the "Walter," contrived and perfected between 1863 and 1868 by the manager of the *Times* printing establishment, which prints both sides by one operation from a continuous roll of paper. The "Walter" machine is represented in Fig. 4.

A reel of tightly rolled paper, just as it leaves the mill, is placed at one end of the machine, is damped while passing between small cylinders, and is then led between the first and second of four cylinders, placed one above the other, where it receives its first impression from the stereotype cast of the first cylinder. The paper then returns backward between the second and third cylinders; and passing forward again between the third and fourth, receives on its other side the second impression from the stereotype plates of the lowest cylinder. The roll is next cut into sheets, and the sheets numbered by an index. Carried up to the top of the machine the sheets descend perpendicularly, and are thrown alternately backward and forward on to boards held by two lads. These, with the striker, who starts the machine, are the sole attendants necessary. The paper travels at the rate of 1000 ft. per minute, and the finished sheets are delivered at the rate of 12,000 copies and upward per hour. Repeated experiment has proved that good work may be done at the rate of 17,000 copies per hour. The other web-printing machines differ more or less considerably in idea or details from that just described. The "Bullock," which is the invention of an American, has also done excellent book-printing at the rate of 12,000 sheets per hour. The "Victory," nearly contemporaneous with the "Walter," differs from it in several points. It does not damp the paper; it has only a single delivery; but it delivers the finished sheets ready folded. The "Prestonian" will print from type, whereas all other web-machines print only from stereotype. One of the most recent web-printing patents is the Hoe web-machine, which is also very favorably spoken of.

By the introduction of the steam-presses which we have now described, the profession of the printer has within these few years undergone a most extraordinary revolution; and although fewer hand-pressmen are now employed than formerly, the increase of employment to compositors, engineers, book-binders, book-sellers, etc., must be very great. The principal advance in the profession has been since the year 1832, when the printing of cheap literary sheets rose in o importance; and, by a fortunate coincidence, the patents of various machines having about the same time expired, a new impulse was given to the trade. The making of printing-machines has in itself become a great business. The printing-office is a factory; and the interior of one of those concerns usually presents a remarkable spectacle of industry, animate and inanimate, which to a stranger leaves a lasting impression on the memory.

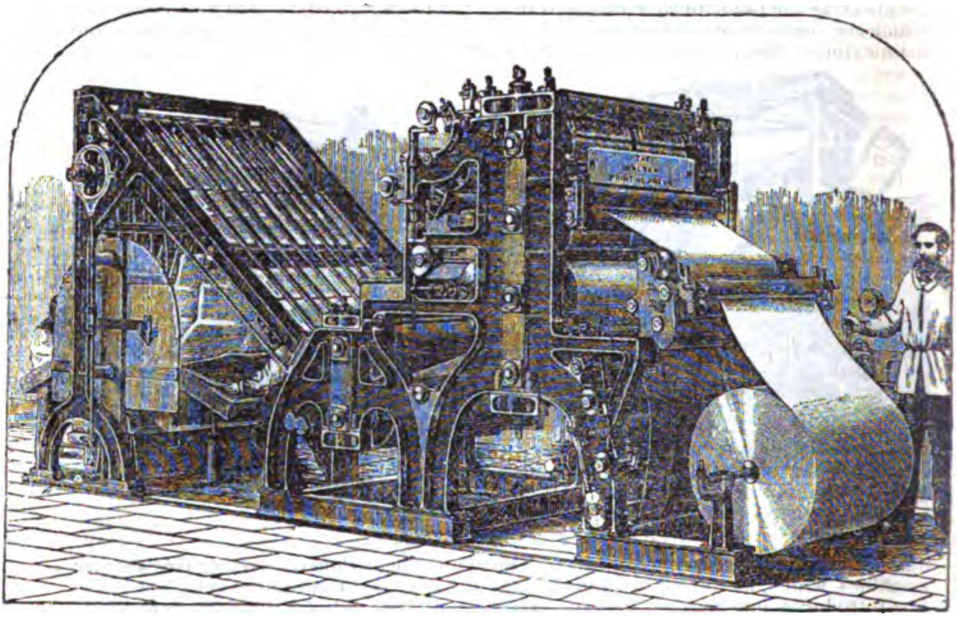

FIG. 4.—The Walter Printing Press.

In printing, a remarkable American invention was brought into use in 1867. It is called the matrix compositor, and is only adapted for stereotyping, by making impressions on thick, soft paper of the letters in the order required, and then taking casts of the same in metal as usual. The peculiarity of this machine is that it brings up any letter the compositor wishes to its right place in the line by simply touching the key which answers to that letter, in an arrangement like the front of a piano, each key being marked with its corresponding letter At the moment the letter is brought to its place, it is made to press into the paper; and in this way the composition proceeds with only one alphabet of fixed types, which are made of steel to bear the pressure. With practice a good compositor will work this machine, and thus form the matrix for the stereotype plates, as fast as he could set up the ordinary movable types The saving in time and the wear of type is therefore very considerable.

PRINTING (*ante*). The first web-perfecting press was invented by sir Rowland Hill, the well-known English advocate of cheap postage. His machine was built in 1835, but was found impracticable; and although Jephtha A. Wilkinson and Richard M. Hoe made efforts to improve it up to the desired point of availability, it was without success. It was not until 1861 that the first practical perfecting machine was invented by William A. Bullock, an American, and set up in Cincinnati. It is to be remembered that to col. Hoe was due the improvement of printing from a rotary cylinder; to which the addition of the web-perfecting system, as completed by Bullock, was the necessary adjunct to insure the grand results which have followed in the art of newspaper printing. The Bullock press was followed by the Walter (English) press (see PRINTING), *ante;* but neither of these could produce more than 10,000 perfect impressions per hour, and an increase in capacity became necessary to correspond with the increasing circulation of the daily press. This improvement was effected by R. Hoe & Co. in their perfecting press, which was brought up to a capacity, when pushed, of 18,000 copies per hour. The paper for this press is manufactured in rolls or continuous "webs," one of them turning out a strip of paper 4½ m. long, and of suitable width. This is delivered wound on a wooden roller, and is wet by being passed under a spray while being transferred from one roller to another. Having been properly wet, it is placed in position in the press, one end of the paper being drawn between the proper cylinders at the rate of about 10 m. an hour. It thus receives its two impressions, when it is carried between a pair of cutting cylinders, which perforate it, but do not divide it, and it continues its journey, over endless tapes, until it reaches a set of rollers which divide it. It is not, however, carried immediately to the fly, but an "accumulating cylinder" receives it until six sheets are ready for delivery, when these are placed on the receiving table in an orderly pile. Delivery occurs at the rate of 300 sheets per minute, involving only 50 movements of the fly to secure them. By combining with the press a folding-machine it became possible to deliver the papers folded, and ready for mailing. By these improvements a simplification of machinery was accomplished, which dispensed with the large number of hands formerly required to run the press, and receive and fold the papers. The Hoe perfecting and folding press is about 5 ft. high, 6 ft. wide, and 24 ft. long; including the folding attachment. In 1875 a web-perfecting press was invented by A. Campbell, which can print, paste, and fold any number of pages up to 24.—Comparatively little heavy printing is now done from type, either stereotype or electrotype plates being used. The papier-maché process of making plates has made possible the rapid production of large editions of newspapers, and this process is worked as follows: the paste is made of a composition of flour, starch, alum, and water, the latter being added boiling, after which the compound is stirred over a fire until boiling, and then left to cool. When used, Spanish whiting is added, after which the paste is spread on a sheet of soft, unsized paper, and then covered with three sheets of tissue paper, when the whole is saturated with water, and laid aside for a day. The face of the type being touched with olive oil, powdered French chalk is put on the tissue side of the prepared matrix, and it is laid carefully on the type. Damp linen is laid over it, and the whole is beaten lightly with a brush against the type. This linen being removed another sheet of the prepared paper is placed on the back of the matrix, when both are beaten in the same way as before, which completes the impression and unites the two sheets. A blanket being now put over the matrix and form, the whole is placed in the drying-press, which is screwed down, when steam heat is applied until the matrix dries. When this is accomplished the matrix is taken out, warmed on the molding-press, and placed in a heated casting-mold, and the metal is poured in. The plate is afterward taken out and finished. In order to have a curved plate it is only necessary to have the mold curved. The paper matrix is not injured by one casting, but will serve to supply as many as twenty duplicate plates.—Electrotyping was first applied to printing by Joseph A. Adams, a wood-engraver, in New York, who reproduced engraved work by the process in 1843, when it was applied in the printing of *Harper's Illustrated Bible*. The form being coated with graphite, using a soft brush, a mold is made of beeswax; the latter, after melting, being run into a shallow pan. An impression of the form is taken in the wax, after which finely pulverized graphite is worked into the letters and lines, either dry, or by Knight's wet process. The mold, thus prepared, is placed in a solution of sulphate of copper, and made part of an electric circuit, which includes also the zinc element in the sulphuric acid bath. The current deposits a copper film on the prepared surface of the mold, and when this has reached the requisite thickness, the latter is taken from the bath, the wax removed, the shell trimmed, the back trimmed and filled with an alloy of type metal, and shaved, when the plate is ready for use, and will print as many as 300,000 impressions. Copper-faced type were invented by Dr. L. V. Newton, of New York, in 1850; and stereotype-plates are also copper-faced, the process enabling longer use.—Type-setting and distributing machines have interested the inventors of printing material for more than half a century, and more than 100 patents have been granted in Europe and America for machines for this purpose. In 1820 Dr. Wm. Church, of Connecticut, patented a composing-machine, but it did not become popular. One was invented in Copenhagen, which met with better success, and was used on a local newspaper. It was exhibited in operation at the Paris exposition of 1855, composing and distributing the type at the same time.

The capacity of this machine was considered equal to three compositors. In 1856 Robert Hattersley, of Manchester, Eng., invented a machine which set about 4,000 to 6,000 per hour, and was accompanied by a distributing machine. At the London international exhibition of 1871, a machine invented by A. Mackie, an Englishman, was exhibited, which could be worked by steam. In 1871 the proprietor of the Warrington, Eng., *Guardian* patented a steam type-composing-machine which was successfully used in a number of English printing-offices. It was claimed that this instrument, with one man and three boys to feed the type and space out the lines, would set up a newspaper column as large as a column of the London *Times* in one hour, which the inventor asserted was equivalent to the composition of eight men. This machine cost £500. In 1875 M. Delacambre, a Frenchman residing in New York, completed a composing-machine on which he had worked 20 years. Another was produced in Boston, in 1870, by O. S. Brown, which did both composing and distributing. The Alden machine, which has perhaps been the best known of any, was begun by Timothy Alden of Massachusetts, in 1846, and improved by his brother, Henry W. Alden. In 1875 two machines were patented by A. C. Richards, one of which was for composing, the other for distributing. An ingenious machine patented in 1875 by Charles S. Westcott, of New Jersey, cast the type from molten metal which was supplied from a tank, a matrix being arranged for every character, and which provided the one which was called for by the pressure of a key. This machine did not require any distributing apparatus, the dead metal being melted up as required. Although none of these machines have come into general use, a number of them have been operated in one printing-office in New York for several years with entire satisfaction. The objections urged against their use are. 1st, their expense; 2d, the amount of type-breaking which most of them accomplish; 3d, their liability to get out of order, and the constant expense of repairing them.

The principal type employed in ordinary English printing are the following, arranged in order according to size. brilliant, diamond, pearl, agate, nonpareil, minion, brevier, bourgeois, long primer, small pica, pica, English, great primer. Among the large number of newspapers published in New York, few do their own press-work; and extensive establishments exist, running from 10 to 50 presses, working day and night, and printing weekly and even daily papers, at a specified cost per token for press-work. So systematic has the business of newspaper printing become, that other establishments receive the printed sheets from the press-room, and fold, wrap, and direct them for the mail, finally sending them to the post-office and paying the postage, charging the latter expense, with a fair compensation for their labor in their bills. In book and job-printing, the composition and press-work are somewhat more frequently done in the same establishment. Some manufacturers conduct the entire production, including binding, and electrotyping, and stereotyping, under one roof. An important adjunct to a large printing-house is the proof-reader, with his corps of assistants; and such a staff is maintained by every large newspaper and book-publishing house. Proofs are usually first taken from the type in the galleys; these are read by the proof-reader, and returned for correction, after which a second proof is pulled for revision; in the case of book-work, page-proofs are next pulled and read; and with newspapers, proofs in form. The head proof-reader is usually a man of good education, a practical printer, acute and quick in discerning errors in style as well as typographical errors; and, moreover, one well versed in general knowledge.

The first style of type cast was the gothic or old German text, with which the Mazarin Bible was printed about 1453, a copy of which was sold at auction in New York in April, 1881, for $8,000. Greek characters were not used until 1465, and the Roman type two years later. What is known as the *italic* was invented by Aldus Manutius about 1500. The Hebrew letter was first used in a Bible printed in Italy in 1488. The first book printed in English was a translation of the *Reçueil des Histoires de Troyes*, printed by William Caxton in 1471, and of which a few leaves can be seen in the Astor library, New York. It was not until the close of the 16th c. that books began to be printed in the Oriental languages. At present the large printing establishments in the chief cities of Europe and America can supply fonts in nearly all written languages; and the imperial printing-office in Vienna has the Chinese, Sanskrit, Egyptian (hieroglyphic), Assyrian (cuneiform), and others not to be found elsewhere. A copy of the Lord's prayer was printed in that office in more than 200 different languages and dialects; and in the national printing-office in Paris are fonts including 56 Oriental languages, and 16 European languages that do not employ the Roman letter.

PRINT-WORKS, in point of law, are regulated by the statutes 33 and 34 Vict. c. 62, and 37 and 38 Vict. c. 44, so far as regards the labor of children, young persons, and women; and the statute applies to all buildings where persons are employed to print figures, patterns, or designs upon any cotton, linen, woolen, worsted, or silken yarn, or woven or felted fabric, not being paper. The works are subject to the inspection of the factories' inspectors, to whom particulars of the business and place are to be duly sent. Children under 10 years of age are not to be employed. No child under 14, or female, is to be employed during the night. Children under 14 must be sent by the parent to school for at least 60 days in the year, and certificates of these school attendances must be obtained before a child can be employed. A child between 13 and 14 ranks as a young person if holding a certificate of proficiency in reading, writing, and arithmetic. A register is to be kept of all the persons employed, and the times of employment; and the employment of any one contrary to the act, subjects the occupier of the works to a penalty.

PRI'OR. See MONASTERY.

PRIOR, MATTHEW, an English poet, was b., it is supposed, in London, where his father was a joiner, on July 21, 1664. He was educated, through the liberality of an uncle, at Westminster school; and in 1682 he was sent by the earl of Dorset, whose friendship he had formed, to St. John's college, Cambridge. Here he took his B.A., obtained a fellowship, and made the acquaintance of Charles Montagu, afterward earl of Halifax, in conjunction with whom he produced *The City Mouse and Country Mouse,* written to ridicule Dryden, in which it did not in the least succeed, although it lives yet in virtue of its own wit, polish, and grace.

After 1688 Prior was introduced to court by the earl of Dorset, and was appointed secretary to the embassy which was sent to the Hague in 1690. His conduct gave satisfaction to King William; and the lucky and well-mannered poet was appointed afterward to several posts of a similar description. He was a favorite at the courts of Holland and France. In 1701 Prior entered parliament; and soon after he deserted the whigs, and went over to the tory party. In 1711 he was sent by government to Paris with private proposals for peace, and on his return he brought with him one of the French ministers, who was invested with full powers to treat. At Prior's house, shortly after, the representatives of the British government met the French plenipotentiary; and his connection with this meeting was made the ground of a charge of treason, on which he was committed to prison, but released after a confinement of two years, without a trial. He had now nothing to live by except his fellowship and his wits. The publication of his poems by subscription, however, brought him 4,000 guineas; and at the same time, lord Harley, son of the earl of Oxford, bought a small estate in Essex, and conferred it on him for life. At the age of 57 he died at the seat of the earl of Oxford, Sept. 18, 1721. A monument was erected to him in Westminster Abbey.

Prior was one of the few poets who was also a diplomatist and man of the world. He filled his public offices with credit to himself, and he had the knack of making friends among those who had the giving of places and pensions. His poems, which comprise odes, songs, epistles, epigrams, and tales, are not much read. He has no fire, no enthusiasm, but everything is neat, pointed, well turned; and his lighter pieces are graceful and witty. If there is little inspiration in his verse, there are the polish and felicity of a scholar and man of society.

PRISCIAN (Lat. *Priscianus*), surnamed CÆSARIENSIS, either because he was born or educated in the town of Cæsarea, is perhaps, in point of reputation, the first of Latin grammarians, though one of the last in point of time. He belongs to the middle of the 5th c., if he is not even considerably later, for he is mentioned by Paulus Diaconus as a contemporary of Cassiodorus (468–562 A.D.). He taught Latin at Constantinople, probably to the imperial court, for he enjoyed a government salary. The work which has mainly preserved his name is his *Commentariorum Grammaticorum Libri XVIII.*, dedicated to his patron the consul Julianus. The first 16 books treat of the different parts of speech as conceived by the ancients; the remaining two are devoted to syntax, and in one MS. bear the separate title of *De Constructione libri duo.* Priscian's Commentary is, for the time, a solid and comprehensive work, the production of a man of great learning and good sense, and is enriched with quotations from many Greek and Latin authors no longer extant. The epitome executed by the German bishop, Rabanus Maurus (flor. in the 9th c.), was very popular in the middle ages. Besides the Commentary, Priscian wrote six smaller grammatical treatises, and two hexameter poems of the didactic sort, *De Laude Imperatoris Anastasii,* and a free translation of the *Periegesis* of Dionysius. The first editon of Priscian appeared at Venice (1470); the best is that by Krehl (2 vols., Leip. 1819–20).—The phrase, "to break the head of Priscian," means to grossly violate the rules of grammar.

PRISCIL'LIAN, the author, or rather the chief propagator in Spain, during the latter part of the 4th c., of the doctrines professed by the sect known from his name as PRISCILLIANISTS. The first seed of their doctrines is said to have been carried into Spain by a Memphian named Marcus. Priscillian was a man of noble birth; and by his eloquence and ascetic life obtained so much consideration, that a numerous party, including some priests and at least two bishops, attached themselves to his school. His doctrine was substantially that of the Manichæans (q.v.). He taught expressly the *Dualism* and the *Docetism* of that sect, and it is equally certain that he adopted the moral consequences as to marriage, etc., by which they had rendered themselves obnoxious even to the civil authorities in the east and Africa. He was warmly opposed by two bishops, Idacius and Ithacius; and the council of Cæsar-Augusta (Saragossa) having in the year 380 condemned his doctrines, a decree for his banishment was issued in the same year. He not only obtained, however, a reversal of this decree, but succeeded in effecting the banishment of his chief opponent, Ithacius. By an appeal to the usurper Maximus at Treves, Ithacius caused Priscillian and several of his followers to be brought to trial, and put to death, in 385; a proceeding which was regarded with so much abhorrence by St. Martin of Tours, St. Ambrose, and other bishops, that they separated from the communion of Ithacius. The sect did not die out with its founder, though there was a considerable reaction against it at the close of the 4th c.; and at all times through the mediæval period we find its traces under various names and forms, especially in the n. of Spain, in Languedoc, and in northern Italy.

PRISM, in geometry, a solid figure which can be most easily conceived of if we imagine a number of plane figures (triangles, quadrilaterals, etc.) exactly similar in form and size to be cut out of paper or any thin plate, and piled one above the other, and then the whole pile to become one body. It will thus be seen that the top and bottom of the prism are similar, equal, and parallel to each other, and that the sides are plane figures, rectangular if the prism be "right" (i.e., if in the above illustration the pile of plane figures be built up perpendicularly), and rhomboidal if the prism be "oblique" (i.e., if the pile slope to one side); but under all circumstances the sides of a prism must be parallelograms. The top and bottom faces may be either triangles, squares, parallelograms, or quadrilaterals of any sort, or figures of 5, 6, 7, etc., sides, provided only both are alike; and the number of sides in the plane figure which forms the top or bottom, of course determines the number of faces of the prism: thus, in a triangular prism, there are 5 faces in all (3 sides and 2 ends); in a quadrangular prism, 6 faces (4 sides and 2 ends), etc. If two prisms, one being "right," and the other "oblique," have their bases of equal area, and be of the same vertical height, their solid content is the same, and is found by multiplying the area of the base by the vertical height. The parallelepiped (q.v.) is a quadrangular prism, and the *cube* is a particular case of the parallelepiped.—PRISM, in optics, is a triangular prism of glass or other transparent substance, its two ends being isosceles triangles, and having most frequently a very acute vertical angle, which gives the prism the appearance of a long wedge. The prism is a most important instrument in experiments on the refraction of light, and, in the hands of the most eminent optical philosophers, has been the means of largely adding to the science of optics. See REFRACTION.

PRISON DISCIPLINE means the method in which criminals, or other persons subjected to imprisonment are managed. In this, which is its original sense, prison discipline, as actually practiced, may be good or bad in the estimation of the person speaking of it. Of late, however, the term has obtained a new meaning, having been used to express not merely the practice of ruling prisons, but the science of properly ruling them. It has gone even further, and sometimes has been used to express the principles of penal administration or the philosophy and practice of punishment. This has arisen from the circumstance, that gradually other punishments have been dropped in this country, and detention within edifices and the grounds attached to them has become almost the only method of punishment for crimes. Torture, exposure in the pillory, and other like dedications of the offender to public vengeance, have been long abandoned as barbarous. Death-punishment has been much narrowed in its application; and transportation, apart from any question as to its effectiveness, has been rendered impracticable, except within a very narrow compass. We get nothing from the practice of the times anterior to Christianity, nor yet from that of the middle ages, to help us in estimating modern systems of prison discipline. They are a development of civilization; and, contradictory as it may seem to say so, of personal liberty. The institution of slavery renders any such system unnecessary. It removes the function of punishing ordinary criminals from the public administration of the affairs of a state, and places it in private hands. Hence, we have no criminal law, properly speaking, coming down to us from antiquity. The *corpus juris*, so full of minute regulations in all matters of civic right, has very little criminal law, because the criminals became slaves, and ceased to be objects of the attention of the law. When imprisonment became a function of the state in the administration of justice, it was often carelessly, and hence tyrannically, exercised, because the practice of awarding it as a punishment arose more rapidly than the organization for controlling its use. On several occasions, grave abuses have been exposed by parliamentary inquiries and otherwise in the practice of prison discipline in this country. The exertions of Howard, Mrs. Fry, and other investigators awakened in the public mind the question, whether any practice in which the public interest was so much involved, should be left to something like mere chance—to the negligence of local authorities, and the personal disposition of jailers. The tendency lately has been to regulate prison discipline with extreme care. The public sometimes complain that too much pains is bestowed on it—that criminals are not worthy of having clean, well-ventilated apartments, wholesome food, skillful medical attendance, industrial training, and education, as they now have in this country. There are many arguments in favor of criminals being so treated, and the objections urged against such treatment, are held by those who are best acquainted with the subject to be invalid; for it has never been maintained by any one that a course of crime has been commenced and pursued for the purpose of enjoying the advantages of imprisonment. Perhaps those who chiefly promoted the several prominent systems expected from them greater results, in the shape of the reformation of criminals, than any that have been obtained. If they have been disappointed in this, it can, at all events, be said that any prison in the now recognized system is no longer like the older prisons, an institution in which the young criminals advance into the rank of proficients, and the old improve each other's skill by mutual communication. The system now received is that of separation, so far as it is practicable. Two other systems were tried—the silent system and the solitary system. The former imposed entire silence among the prisoners even when assembled together; the latter endeavored to accomplish their complete isolation from sight of or communication with their race. By the separate system, the criminals are prohibited from communicating with each other; but they are visited by various persons with whom intercourse is more likely to elevate than to debase—as chaplains, teachers, scripture-readers, the superior officers of the prison, and those who have the external control over it.

PRISONERS OF WAR are those who are captured from the enemy during naval or military operations. By the laws or recognized principles of war, the entire people of a vanquished town, state, or nation become the absolute property of the victors; but civilization has greatly modified this stern rule, and except when a country is devastated for military reasons, it is rare for non-combatant citizens to be subjected to penalties of conquest, beyond the levying of contributions in money or provisions. The combatants who have laid down their arms become prisoners of war. Their lives and liberty are at the disposal of their conquerors, and even in modern times, their lives are sometimes taken, as, for instance, when Napoleon put the Turkish prisoners to death at Jaffa in 1799; otherwise, prisoners of war are kept in confinement until peace ensues, or they are exchanged for prisoners of their conqueror's nation, held in captivity by their own countrymen. It is unusual to subject prisoners of war to penal discipline; but the loss of liberty and hard fare (for, of course, they are allowed no more than a bare subsistence) render captivity sufficiently irksome. In ancient times, the treatment of prisoners of war was far more severe. In the Greek wars, it was no uncommon thing to put the whole adult male population of a conquered state to the sword, while the women and children were enslaved. Although the putting to death of prisoners became less frequent, they and their families were commonly reduced to slavery to as recent a period as the 13th century. About that time, the more humane custom of exchanging prisoners came into practice. Notwithstanding frequent exchanges, large numbers of prisoners accumulate during war. In 1811 about 47,600 French were prisoners in England, while 10,300 English languished in the prisons of France. See PAROLE.

PRISONS AND PRISON DISCIPLINE (*ante*). To regard criminals with a kindly view to their reformation, or at least to their moral improvement and physical comfort, is a recent development of our civilization; and the progress already made is not to be in boasted of. What has been done is aimed to attract criminals into the ways of industry, instead of so conducting punishments as to breed new vices.

The first step in prison reform was in Italy, 1704, by pope Clement XI. in the establishment of the prison of St. Michael for boys and youths, on the plan since known by many names, and lastly as the "Auburn system"—the system of separate cells at night, and silent associated labor by day. "Howard visited it and praised it a hundred years ago," and found within it on a marble slab this inscription in Latin, "It is of little use to restrain criminals by punishment, unless you reform them by education." In England in 1728 gen. Oglethorpe, the founder of the state of Georgia, then in parliament, procured the appointment of a committee of the house of commons "to inquire into the state of jails in this kingdom." The inquiry awakened general indignation at the shameful and cruel condition of the prisons, expressed through pamphlets, newspapers, and by the cartoons of Hogarth. But there was no efficient government action behind it, and small good came of it. In 1785 another reformer, William Hay, pointed out the horrible abuses of the prison system, and made a clear and concise statement of the remedies. At the same time Wesley and Whitefield preached and prayed for reform; but the government took side with the prison tyrannies, and forbade their preaching "sedition." Blackstone's commentaries in 1765 shook public confidence in the barbarous system, sustained by a semi-barbarous government, but its influence worked slowly. Montesquieu's *Spirit of Laws*, in France, and Beccaria on *Crimes and their Punishments*, in Italy, widened the circle of intelligent warfare on barbarism intrenched in the feudal governments and laws of all these countries. John Howard, in 1758, began his wonderful career of 31 years in visiting the jails of England, Belgium, France, Germany, Italy, Denmark, Sweden, Russia, Spain, and Portugal, and their pest-houses as well, and even sought where pestilence raged in Malta, Smyrna, and Constantinople, to study the means of relief from it. No man has united more remarkably the zeal of a martyr with the calm intelligence of a statesman in the service of philanthropy. In 1772 a clergyman of the name of Denne proposed the thing which pope Clement XI. had done in 1704, in a pamphlet which attracted attention. About the same time Howard being made high sheriff for Bedfordshire, practical improvements in England began, and have since worked very slowly, to a better state of things. In 1765 the empress Maria Theresa, of Austria, gave her aid to the work. Viscount Vitain XIV., in 1775, founded the convict prison at Ghent, having separate cells and a more intelligent and humane system of discipline than ever before attempted on a large scale.

"Here then," remarks the rev. Dr. E. C. Wines, "in the prison of Ghent, we find already applied the great principles which the world is even to-day but slowly and painfully seeking to introduce into prison management. What are they?"

When Howard died the general movement lost its force, and reforms fairly begun gave way to the reflux tide of former abuses. Jeremy Bentham, in 1791, renewed public attention to the subject. In 1813 Elizabeth Fry, a lady of aristocratic connections in London, a member of the society of Friends, a devout woman singularly endowed with benevolence, strength of will, and feminine graces, commenced her visits to Newgate prison. She found the condition of women in prison simply appalling, and awakened a new interest in prison reforms. Wilberforce and Buxton aided her in parliament. In 1823 sir Robert Peel put aside the medley of old English laws pertaining to prison discipline and framed a new code called the consolidated jail act, which went into immediate effect. It was a crude law, providing for no classification among convicts, but it made some steps forward, and swept away still more vicious old laws, under which prisons were simply hot-beds for propagation of crime.

In the United States prison horrors in the early days differed only from those of the parent country in the fact that prisons were rare, and of so simple a character that it was not so easy for shameful cruelties to be practiced unseen as in great dungeons. Dr. Wines states that "Connecticut for more than 50 years, 1773–1827, had an underground prison in an old mining pit near Simsbury, which equaled in horrors all that was ever related of European prisons." In Philadelphia all grades of criminals, and both sexes, were mingled in horrible disregard of decency and humanity, in the city prisons; and liquors were served to prisoners from a bar kept by a prison official. In Boston it is told that a thousand debtors were confined in common night-rooms with a thousand criminals.. "Men, women, boys, lunatics, drunkards, innocent and guilty, were mingled pell-mell together." In New York in the early days, negroes were burned alive and hanged in iron frames to die of starvation. Every village had its stocks, pillory, and whipping-post. Delaware alone retains them. Reforms began in Philadelphia by the formation in 1776 of the "Society for alleviating the miseries of public prisons;" reorganized more efficiently in 1787, and said to be still active and useful. The Boston "Prison discipline society" was organized in 1824, existed for 20 years, and accomplished its mission. The "Prison association of New York," organized later, and is still active.

Americans (omitting the living) whose work in promoting prison reforms has been too noble to be passed over without mention, are Dr. Rush, Elam Lynds, Gershom Powers, Roberts Vaux, Matthew Carey, Louis Dwight, Amos Pillsbury, Francis Wayland, Francis Lieber, Charles Sumner, Samuel G. Howe, John D. Wolfe, John Stanton Gould, John W. Edmonds, Isaac T. Hopper, William H. Seward, Abraham Beal, and Dr. E. C. Wines. In 1870 the "National prison association of America" was formed, now becoming one of the most efficient in the world, unifying all the humanitarian influences of all the state officials into one body. Their intelligent and practical study of prison questions, their comparison of experiences and methods, their essays and reports, form a college of intelligence that cannot fail of beneficent results. Prison reform congresses were held in Cincinnati in 1870, Baltimore in 1872, and St. Louis in 1874. In Europe a congress of those particularly interested in prison improvements was convened at Frankfort in 1845, under the direction of Ducpetiaux, inspector-gen. of prisons in Belgium. Many others have followed. A permanent commission to collate information was appointed at the London congress in 1872, which commission held a session at Brussels in 1874, and at Bruchsal, Germany, in 1875. France and Italy have similar national commissions. In the United States, state legislation has seconded the efforts for reform.

The tendency of experienced men in prison discipline is now to longer terms of imprisonment, in order to control and complete reformation. They also insist on massing the prisons of a state into great establishments where thorough systems can be carried out to better advantage, where appliances for every practicable trade can be provided, and where the petty tyrannies and indecencies of common jails are less likely to obtain. The propriety of definite sentences for crimes is questioned, and it is claimed that the officers of the prisons should have a wide discretion, and that conduct, character, and degree of reformation should have very much to do with the long retention or the earlier freedom of the criminals. Separation of prisoners from each other, or the single-cell system, forms not only one of the greatest punishments for most criminals, but one of the most essential means of preventing the scandals of old prison-yards, where the most skillful and hardened criminals could exchange and increase each other's knowledge of crime, where the greatest criminal was the hero of the circle, and the younger or less vicious inmates were exposed to all the brutalizing influences of a robber's den. Pennsylvania has the honor of having made the first great step in the amelioration of the condition of prisons and prisoners. In 1786 in the new Walnut street prison the system of solitary confinement in single cells was begun, but under conditions that rendered it a failure. Absolute seclusion, without books or society, resulted not in reform, but in savage moodiness and insanity. It has been tried in several states, under more humane conditions, by giving prisoners an abundance of reading matter, opportunity to talk with keepers, and by occupation for both body and mind during the day in some industry. Now, while a good system requires that each prisoner shall have his separate cell, congregated work is practiced; cells are lighted to allow reading after work hours; conversation with prison attendants is not discouraged; and men known or supposed to be not injurious to each other's character, or likely to concoct mischief, are permitted communication with each other. Associated labor in gangs, or in work-shops in absolute silence, theoretically, and absolute isolation in cells having no means of communication one with another, constitute the cellular and associated labor-system in use in most great prisons in the United States. Of course the absolute silence enjoined between men working together side by side, day after day, and year after year, is of itself a terrible punishment. But it is unfortunately the worst punishment for the best class of criminals, for just in proportion as the inmates are endowed with those qualities which tend to make them decent and agreeable members of society—intelligence, sociability, kindliness—in that proportion are they punished by being deprived of the power to exercise their good qualities. Those who are constitutionally ugliest are apt to be morose at the best, brood over their work with least longing for fellowship, and least punishment; while both the best and the worst of these who thus only can speak to their fellows by stealing their opportunity, are neither improved nor reformed by the enforced silence. All are under a continual pressure *to steal*—not objects of value to others, but their own power of speech and means of fellowship.

The originator of the ideal system to which our prisons are making gradual approaches—called the system of progressive classification—was the English capt. Alexander Maconochie, a worthy successor of the noble Howard, who 40 years ago perfected a system, and on his own application was made governor of the British penal colony of Norfolk island, for the purpose of putting it to practical test. There were then 1500 convicts on the island, made up of the worst malefactors from Britain. Maconochie called his plan the "social system of prison treatment." Its basis is the belief that a state of cheerfulness, hopefulness, and kindly treatment is essential for improvement and reform among criminals. His system proposes four main aims and methods, as follows: 1. A labor sentence instead of a time sentence, so that prisoners know at once that they can by labor shorten imprisonment in proportion to industry. 2. To enable them to have their punishment further lessened by their good behavior daily recorded, and cumulative to their advantage, thus placing a constant premium on self-restraint. 3. By giving degrees of social liberty in proportion to the good use made of it, and encouraging the exercise of genial qualities. 4. By giving the prisoner a part of the wages of his labor, to be put in his possession on leaving the institution, or to go to his family, and preparing him to resume a decent place in society by showing confidence in him, and releasing him from restraint in proportion as he develops self-respect and disposition toward good citizenship. Thus the prison life is regarded as one in which the convicts are to be re-reared—as a family of peculiar children, each of whose peculiarities was to be considered. It is assumed that the worst of traits in a convict do not prove him devoid of some good ones; and that the incentives to good life should be made much greater and more pleasant than to a bad one. The work of testing his system began by offering the convict pay for his work by marks, with which marks when earned he could buy his own food, clothes, and other necessaries, and form a surplus to be credited to his liberation, on the supposition that he is sentenced to a specific number of days' labor, or marks. He fixed ten marks as the equivalent of a day's labor; then paid by the piece, and not by time, and for every ten marks saved the term of imprisonment was lessened a day. Prisoners could buy their own provisions at three different rates, paying for them in marks at the supply store of the prison. The poorest fare cost three marks, the next four, and the best five. Thus the zeal for freedom would stimulate not only industry, but the utmost self-denial and economy. Over-work was paid for in extra marks at the same rate as regular work; and misdemeanors of any kind being subject to a fine in marks, the mark-record of prisoners was at the same time their industrial and moral spur and their savings-bank. He did not attempt to bring about the emulation and ambition which this system is calculated to inspire by at once supposing the prisoners to be ready for it, but divided the terms of their sentences into three periods. During the first, or punishing stage, the men were subject to close surveillance and discipline. At the expiry of this term they could divide themselves into companies of six, by mutual consent only. Each six were to have a common fund of marks, into which all their earnings were to be paid, and from which the fines of any and all that company must be paid. This is, perhaps, the most original reform of the whole system, and at once makes the germ for the growth of all the qualities that are essential to a good member of society. Each man becomes interested in the industry and good behavior of his associates in a manner so direct and palpable in every way that the effect of the voluntary partnership is to keep all the partners in a continual state of watchfulness and emulation, or of shame to the one who may be derelict to the interests of his immediate companions. Dishonest and selfish as they might be, they are thus made to feel that shirking by any one of them hurts all; so that a majority must all the time use a pressure for industry and fair play. As they had no way of punishing each other for short-comings, the consequence was the creation of an honorable conception of mutual duty and forbearance. In the third period of the sentence the prisoner was to be thrown on his individual character, and to be permitted, under the same system of marks or wages, to profit or lose for himself alone according to his industry and good behavior. In the tropical island of Norfolk, where the experiment was undertaken by capt. Maconochie, he was able to add some privileges to the prisoner in the third term of the sentence not practicable everywhere. He was allowed a hut and garden, pigs and poultry, which might be sold for his benefit to the ships that touched at the island. Thus, by all these means this great reformer taught the prisoners industry, appreciation of the rights of others, the mutuality of rights and obligations in a community, self-reliance, and self-respect. He spent four years in this experiment and thus states the result: "I found the island a turbulent, brutal hell; I left it a peaceful, well-ordered community." Sir Walter Crofton succeeded him, and organized the system more perfectly to adapt its discipline and methods to the average grade of the persons who have charge of prisons; that is to say, to a much lower level than would be required were such men as Maconochie in charge. Crofton's modified system, also divided into three stages of imprisonment, consists of: 1, a separate imprisonment of 8 months; 2, a reformatory stage proportioned to the whole length of the sentence, in which the system of Maconochie is retained in principle, but modified in adaptation to give the prisoner a progressive or receding position, and a larger or smaller share of earnings as he advances or fails in industry or conduct. Crofton put his plans into full operation in Ireland in 1854, where three separate prisons were provided to accommodate the graduates from lower to higher degrees. Mount Joy, Dublin, with a capacity of 500, received the newly sentenced; Spike Island at Queenstown, with accommodations for 700; received the probationaries in the second term; and Lusk, 12 m. from Dublin, accommodating only 100, held the graduating class. The first prison punished by solitary confinement, relieved only by labor of the most tedious kind, like picking oakum, and the poorest kind of sufficient food. During this time the convict is thoroughly familiarized with the system of progression which he is afterward to have the privilege of availing himself of. The prison at Queenstown receives the prisoner for the second stage; and here begins the system of marks by which he can acquire privileges and curtail his term of punishment, or, by failing to improve, can remand himself back to punishments and original deprivations. This intermediary prison is the main one, where the educational and social progressive system is put into practice. It is divided, like a college, into classes, through which the prisoners must graduate, and, when they have passed through the three into which the prison divides them, the highest class is fitted for the prison of Lusk, and transferred to it. After going through the penal prison of Dublin the prisoner enters the third class at Queenstown. He must earn not less than 18 marks to pass to the second class, 54 to get to the first class, and 108 to graduate from that to Lusk. As 9 marks a month is the maximum number that can be earned—three for industry, three for school duties, and three for conduct—the prisoner must, at the best, remain in the lowest class two months; in the middle class six months; and in the last, 12 months. Of course, the average of industry, study, and conduct is not such usually as to make the term so short. The prison at Lusk is the most remarkable fruit of the system. Here the prisoner has a degree of freedom and an absence of restraint that puts to the test all his previously acquired self-control and self-respect. There are no walls, prison bars, or armed watchmen before his eyes; no prison garb, physical restraint, or check on social intercourse. The prisoners are employed in groups, mostly on out-door farm work, in company with unarmed wardens, who work with them. They are not even restrained of liberty of escape except by the knowledge of the advantages to be gained by working to the end of their terms, and securing the payment of earnings in store for them. Attempts to leave before the end of their terms have been rare among those who reach this stage of reform. The mark system is not continued at Lusk. The appearance of pupilage is avoided, and men are made to feel themselves a part of the community around them by attending lectures, and public worship at the parish church, and in being trusted in various services out of the eye of any prison officer. There is no physical restraint to prevent their escape day or night. The minimum period of detention at Lusk is 6 months on a sentence of 5 years; 11 months on one of 10 years; 16 months on one of 15 years. At the great intermediary at Queenstown the minimum is 13 months on a sentence of 5 years; 53 months on 10 years; 98 months on 15 years. Prisoners at the two first prisons are mostly employed in bodies, under surveillance, upon public works. They receive no portions of their earnings, but are allowed a certain portion, under the name of gratuities saved for them, and paid to them on leaving the prison at the expiry of their terms. These gratuities are earned by marks during the whole time of their stay at Queenstown, and are forfeitable as one of the punishments for laziness or bad conduct. The greatest possible reduction of the term of imprisonment by good conduct is 13 months on a period of 5 years; 28 months on a period of 10 years; and 3 years and 7 months on a term of 15 years. But the prisoner's freedom is not absolute until the full end of the term for which he was confined. He is provided with a ticket of license for the intervening period: is free to go to work for himself, but must report at regular intervals to the authorities; and, if he fail to keep the conditions of his license, may be remanded back to prison for the remainder of his full term. The same systems, in all respects, is applied to the women convicts at the same places. The basis of the Crofton system is hope. The number of inmates of the prisons just described and their cost for the year ending Mar. 31, 1874, is given in the following table:

PRISONS.	Average Number of Convicts.	ANNUAL COST PER PRISONER.	
		Gross.	Net.
		£ s. d.	£ s. d.
Mount Joy, Dublin, male	151	54 8 6	46 19 7
" " " female	295	32 6 8	26 15 5
Spike Island, Queenstown, male and female	644	30 5 3	14 7 11
Lusk, 12 miles from Dublin	40	68 1 9	39 8 0
Total	1,130	36 6 11	22 17 4

The United States as a nation has no great prison. Each state maintains one or more large establishments, conducted under many different systems, but in general tending to the "social system of progressive classification," and making more or less progress toward it. Each city also has its special prison. The association of prison management with politics, and the facilities permitted in some states for prison officials to have a considerable patronage at their disposition, including the contracts for the labor of the prisoners, is the most unfortunate feature of United States prison systems. State legislatures tend to the most humane and thoughtful liberality in providing for the accommodation and reformation of criminals; so that when prisons are making little progress toward the ideal which Maconochie and Crofton have proved entirely practicable, it is because the officials themselves are not the right men in the right place. A proposition is now (1881) before the legislature of New York to impede the free visiting of the state prisons by the people, on the ground that such visits interfere with their discipline and order; but such interference is a less evil than would result from leaving the prisons to a close corporation of officials. One of the misfortunes of the prison systems in the United States is a disposition to regard the convicts as slaves of the state, whose labor it has a right to confiscate, and the profit of which is so much clear gain to the treasury of the state. Under the plausible plea of making prisons self-sustaining by this use of prison-labor, legislatures may be pleased with those officials who make the best show of profit out of the prisoners to the state treasury; and to effect this prison-labor is farmed out like slave-labor. If this be done under the inspection of intelligent *disinterested* men, devoted to the main work—that of reformation of the inmates of prisons, it is possible to unite the best interests of both convicts and the state; but it is also possible to make the system only a dreadful form of human slavery. It is a grave question how far the state can justly go in the direction of confiscation of a man's labor.

The excellent reformatory systems now in use have one grave fault. Criminals of an intellectual type who endanger society not by their passions but by subtle knaveries, when brought to punishment in prisons, have no difficulty in at once making all possible progress in marks that will give them credits toward freedom. With no abnormal passions, or tendencies to physical crimes, it requires no meritorious effort of the will, no unusual self restraint, perhaps no change of all the knavish habits of a life, to be found worthy of the highest markings. There is a recent case of a man who made great gain by falsifying the entry books of a grain elevator, and then committing arson upon the building. Not for the main crimes which were mysteriously sheltered by some conflicting interests, but for some subordinate part of the crime she was sentenced to three years in the penitentiary. His conduct was excellent, and in considerably less than three years he leaves the prison to enter into the peaceful possession of an ample fortune secured by theft, forgery, and arson.

William Tallack in an essay on humanity and humanitarianism takes ground that in some directions humanity may defeat the object of reform by making the prisons so pleasant for those who occupy them, and the enforced labor so much more agreeable in its surroundings than that of the laborious and virtuous poor, as to make it an object with the latter to do some misdemeanor, in order to enter the reformatories. He cites the house of refuge in Philadelphia as an example of a condition of comfort for the inmates far above that of the homes of ordinary laborers. But this is rather a commentary on the deficient pay for common honest labor than a fault of the prison system. Still Mr. Tallack makes a strong case against those conditions of prison life which deprive it of the character of punishment, and he believes that American prisons may be going too far in the opposite direction from the English tendency to extreme harshness.

There are 45 state prisons in the United States with an aggregate of value of $16,000,000. New York and Indiana each have three, Pennsylvania and Iowa two. Altogether they contain 17,000 cells and sleeping rooms, which is 3,000 less than the number of prisoners. Many of the cells, however, are for two to four persons, and occasionally domitories serve for many. The average size of the cells is 8 ft. length, 4½ ft. width, 7½ ft. height; cubic contents 240 feet. The smallest are those of Sing Sing, N. Y., whose cubic contents are but 147 feet. The whole number of officers and employees in these 45 prisons does not vary much from 1500, or one to 13½ prisoners; their aggregate annual salaries $1,015,000, making their average $677. To this must be added the board of a considerable part of them, and in some cases lodgings for themselves and families. The total annual cost of all these prisons including pay of officers is about $3,000,000, making the average cost of prisoners without credit for their work $150 each; and an average to each prison of $650,000. The aggregate earnings of the labor of the prisoners is about $1,500,000; thus meeting half the cost. But it must be observed that the principal earnings are from a part only of the prisons. Seventeen state prisons are reported as self sustaining, and among these are a few whose receipts considerably exceed the expenses. Seven correctional prisons in which minor misdemeanors are punished with short sentences, more than pay their way by the labor of their inmates. In many of the southern states the lease system prevails—a local form of the coolie trade. Five-sixths of the inmates of the prisons are men, one-sixth women. In the county jails and houses of correction the proportion of women is greater. "The ratio of foreigners to Americans in the state's prisons is out of all proportion to that which exists between the total pop. of foreign-born and native-born inhabitants." Estimating foreign-born population at 12 per cent of the whole we find the foreign born in the prisons to be 25 per cent of the whole prison population. In the eastern, middle, and western states the foreign born in the prisons is nearly and in some states fully one-half the whole number. In the southern states nearly all are natives, and the blacks the most numerous, often being imprisoned for trivial crimes. Prison officers (or a head officer) are appointed in some states by the governors, in some by the legislatures; and in others a state superintendent of prisons is elected. The system of contracting prisoners' labor obtains in 19 states, leasing it in 6, exclusive state management in 9, and a mixed system in 10. The contract system is regarded by the friends of prison reform as open to very grave objections, and is tolerated as a compromise between the desire to make the prisons pay their way and the danger of something more objectionable. It is a dangerous system. Leasing is undoubtedly worse, and has already been alluded to as making the state a slave trader.

STATE.	TOWN.	No. of Cells.	Av'ge Prisoners, 1873.	STATE.	TOWN.	No. of Cells.	Av'ge Prisoners, 1873.
Alabama.........	Wetumpka....	210	200	Nevada..........	Carson City......	46	93
Arkansas........	Little Rock....	232	200	New Hampshire.	Concord.........	132	82
California.......	San Quentin...	453	915	New Jersey......	Trenton..........	536	545
Connecticut....	Weathersfield..	232	180	New York........	Auburn..........	1,232	1,120
Florida..........	Chattahoochie.	1	43	"	Dannemora.....	548	540
Georgia..........	Milledgeville..	....	476	"	Sing Sing, male..	1,200	1,163
Illinois..........	Joliet	1,000	1,288	"	" female	108	108
Indiana, north....	Michigan City.	380	368	North Carolina..	Raleigh..........	88	401
" south....	Jeffersonville..	318	395	Ohio.............	Columbus........	1,110	910
" woman's	Indianapolis...	20	22	Oregon...........	Salem............	88	95
Iowa............	Fort Madison..	318	270	Pennsylv'a, east.	Philadelphia....	560	625
"	Animosa.......	....	....	" west.	Allegheny.......	348	422
Kansas..........	Leavenworth..	344	331	Rhode Island....	Providence......	88	74
Kentucky........	Frankfort......	674	600	South Carolina..	Columbia........	350	250
Louisiana........	Baton Rouge..	498	409	Tennessee.......	Nashville........	352	744
Maine............	Thomaston....	174	146	Texas............	Huntsville.......	....	1,150
Maryland........	Baltimore.....	700	587	Vermont........	Windsor........	104	80
Massachusetts...	Charlestown...	652	578	Virginia..........	Richmond.......	73	782
Michigan.........	Jackson........	648	616	West Virginia....	Moundsville.....	224	98
Minnesota.......	Stillwater.....	163	91	Wisconsin.......	Wapun...........	560	180
Mississippi......	Jackson........	200	288				
Missouri.........	Jefferson City.	....	1,162	Total........	... .	14,668	18,492
Nebraska........	Lincoln........	....	44				

The literature pertaining to prison reforms is profuse. The work of the late rev. Dr. E. C. Wines entitled *The State of Prisons and of Child-saving Institutions in the Civilized World*, 1880, is the latest and fullest compendium. *Prisons and Reformatories at Home and Abroad* is the title of the transactions of the international penitentiary congress of London, held in 1872, edited by Edwin Pears, its secretary. *Humanity and Humanitarianism* is a very suggestive essay prepared for the New York prison association by William Tallack, published in London 1871; and *Woman in Prison*, by Caroline H. Woods, is also extremely suggestive of the need of women's attention to prisons for women. State reports and reports of the American prison congresses give very fully the present condition of American prisons.

PRISREND', a t. of European Turkey (Albania). capital of a district, on the Rieka, 80 m. e. of Scutari. It is one of the most beautiful, rich. and industrious towns in Turkey. with a citadel situated upward of 1100 ft. above sea-level. It contains an immense number of bazaars, and carries on an active trade in flints, saddlery, glass, copper, and steel wares. Among its edifices are 15 mosques. Pop. 35,000.

PRISTI'NA, a t. of European Turkey, in the vilayet of Monastir. 80 m. n.n.e. of Prisrend, stands on a hill, and is the most considerable town in old Servia. Pop. 12,000.

PRISTIS. See SAW-FISH.

PRITHU is the name of several legendary kings of ancient India. It is, however, especially one king of this name who is the favorite hero of the Purânas. His father was Vena, who perished through his wickedness; for when he was inaugurated mon arch of the earth, he caused it to be everywhere proclaimed that no worship should be performed, no oblations offered, and no gifts bestowed upon the Brahmans. The Rishis, or saints, hearing of this proclamation, entreated the king to revoke it, but in vain; hence they fell upon him and slew him. But the kingdom now being without a king, as Vena had left no offspring, and the people being without protection, the sages assembled and consulted how to produce a son from the body of the dead king. First, then, they rubbed his thigh; from it, thus rubbed, came forth a being called Nishâda; and by this means the wickedness of Vena having been expelled, they proceeded to rub the right arm of the dead king, and by this friction engendered Prithu, who came forth resplendent in person, and in his right hand the mark of the discus of Vishnu, which proved him to be a universal emperor, one whose power would be invincible even by the gods. The mighty Prithu soon removed the grievances of the people; he protected the earth, performed many sacrifices, and gave liberal gifts to the Brahmans. On being informed that, in the interval in which the earth was without a king, all vegetable products had been withheld, and that consequently the people had perished, he in great wrath marched forward to assail the earth. The earth, assuming the figure of a cow, fled before him; but seeing no escape from the power of the king, at last submitted to him, and promised to renew her fertility, provided that he made all places level. Prithu therefore uprooted mountains, leveled the surface of the earth, established boundaries of towns and villages, and induced his subjects to take up their abode where the ground was made level. The earth now fulfilled her promise; and as Prithu, by thus granting her new life, became, as it were, her father, she was henceforth called Prithivî. However little the worth of this piece of popular etymology—for *prithivî*, or *prithwî*, "earth," the feminine of *prithu* (Greek *platu*), means etymologically "the large" or "wide"—the legend of Prithu itself seems to record some historical fact regarding the civilizing influences exerted by a great king of Hindu antiquity.

PRIVAS, a t. in France, 400 m. s.e. of Paris, in the department of Ardèche; pop. about 8,000; located on a branch of the railroad between Paris and Lyons. It manufactures raw silks, woolen blankets and other woolen goods, leather, and brandy, and exports iron ores. The town is located upon a ridge overlooking the valley of l'Ouvèze, at the foot of the mountains of Coiron, and has a fine esplanade, shaded with plane trees, overlooking a panorama of great extent and beauty.

PRIVATE, the title applied in the British army to a common soldier of the cavalry and infantry, the corresponding rank in the artillery being gunner or driver, and in the engineers the sapper. The pay of a private is one shilling a day in the infantry, and 1s. 2d. in the cavalry—exclusive of a free ration or corresponding allowance. A private in the cavalry is sometimes called a trooper.

PRIVATEER', a ship owned by a private individual, which, under government permission, expressed by a letter of marque (q.v.), makes war upon the shipping of a hostile power. To make war upon an enemy without this commission, or upon the shipping of a nation not specified in it, is piracy. Privateering was abolished by mutual agreement among European nations by the treaty of Paris in 1856. It is doubtful, however, how far that abolition would stand in a general war, for privateering is the natural resource of a nation whose regular navy is too weak to make head against the maritime power of the enemy, especially when the latter offers the temptation of a wealthy commerce.

PRIVATEER (*ante*). An effort was made at an early period by the government of the United States to have provisions in treaties with foreign countries which would abolish privateering in case of war; and the laws of the United States are more prohibiting in this respect than those of most other nations. At the time of the mutual agreement among European nations to abolish the custom, mentioned in the preceding paragraph, the government declared its willingness to unite with them provided a certain clause of the treaty was amended so that the private property of the subject or citizen of a belligerent on the high seas should be exempted from seizure by public armed vessels of the other belligerent, except it be contraband of war. But this was declined, and consequently no arrangement with the United States was included in the treaty.

PRIVET, *Ligustrum*, a genus of plants of the natural order *oleaceæ*, containing a number of species of shrubs and small trees with opposite leaves, which are simple and entire at the margin; the flowers small, white, and in terminal panicles; the calyx slightly 4-toothed; the corolla funnel-shaped and 4-cleft; the stamens two, projecting beyond the tube of the corolla; the berries 2-celled. COMMON PRIVET (*L. vulgare*) is a shrub growing in bushy places and about the borders of woods in the middle and s. of Europe, and in some parts of Britain, now also naturalized in some parts of North America. It has half-evergreen, smooth, lanceolate leaves; and berries about the size of peas, black, rarely white, yellow, or green. The flowers have a strong and sweetish smell; the leaves are mildly astringent, and were formerly used in medicine; the berries, which hang on the shrub during winter, have a disagreeable taste, but serve as food for many kinds of birds; they are used for dyeing red, and, with various additions, green, blue, and black. A rose-colored pigment obtained from them is used for coloring maps. The wood is hard, and is used by turners, and by shoemakers for making wooden pegs. Privet, although not spiny, is much used for hedges, often mixed with some spiny shrub.

or with beech. It bears clipping well, and grows well in the smoke of towns; also under the shade of trees.—A number of species of privet are natives of different parts of the east, and some of them have begun to be introduced into shrubberies in Britain.—All kinds of privet grow readily from cuttings.

PRIVILEGE (Lat. *privilegium*, from *privata lex*, a private law), a special ordinance or regulation, in virtue of which an individual or a class enjoys certain immunities or rights from or beyond the common provisions of the general law of the community. It differs from a *dispensation* inasmuch as the latter merely relaxes the existing law for a particular case or cases, while the privilege is a permanent and general right. Of ancient and mediæval legislation the law of privilege formed an important branch; and, in truth, the condition of the so-called "privileged classes" was in all respects different, socially, civilly, and even religiously, from that of the non-privileged. In canon law there were two privileges enjoyed by the clergy, which deserve special notice from the frequency of the historical allusions to them—the "privilege of the canon" (*privilegium canonis*) and the "privilege of the forum" (*privilegium fori*). By the former the person of the clergyman, of whatever degree, was protected from violence by the penalty of excommunication against the offender; by the latter—known in England as "benefit of clergy" (q.v.)—the clergyman was exempted from the ordinary civil tribunals, and could only be tried in the ecclesiastical court. Most of the purely civil privileges are abolished throughout Europe by modern legislation.

PRIVILEGED DEBTS, in the law of Scotland, such debts as are first paid out of certain funds. Thus, when a man dies, a certain sum is allowed out of his estate for mournings (q.v.) to the widow and children. In case of bankruptcy servants' wages are privileged to a certain extent.—**Privileged Deeds** are holograph deeds, which are exempted from the statute which requires other deeds to be signed before witnesses.

PRIVILEGES AND IMMUNITIES, a phrase found in art. 4, sec. 2, of the U. S. constitution: "The citizens of each state shall be entitled to all privileges and immunities of citizens in the several states," and in art. 14 of the amendments: "No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States." Taken together, the provisions secure to each citizen the maintaining of all his rights of citizenship, and forbid the refusal by local authorities of equal advantages to all. The object of the first clause is to secure such general rights as redress in the courts of the foreign state, power to purchase and sell property, and privileges of transit. Thus, while the rights of the states in their proper limits are not interfered with, that uniformity of the conditions and privileges of life which pertain to a single nation is obtained. It is impossible to define the "privileges and immunities" which properly come within the meaning of the constitution, and the supreme court has declined to undertake their enumeration. A distinction is made between special privileges granted to citizens as a part of their citizenship, and enactments designed to confine trade or business by unequal taxation or otherwise. Where persons not having their domicile in a state were refused permission to sell goods by sample, trade-list, card, or catalogue, without the payment of a special license-fee, the statute was held to be unconstitutional, as imposing a discriminating tax. In the clause of the amendment above quoted the individual is looked on as a citizen of the United States, rather than of the state of his domicile. Thus it would be unconstitutional for a state to enact a law forbidding its citizens to have recourse to the U. S. courts in any class of cases. Every citizen has the right to enjoy the protection of the general government without disturbance, to use its courts and offices, to navigate its waters, and enter its ports, without restriction by his own or other states. The leading case on this subject is what is known as the *slaughter-house cases* (16 Wallace, 36). Here the Louisiana legislature gave to a certain corporation exclusive rights in maintaining slaughter-houses in the city of New Orleans. It was held by the supreme court that the exclusive right was not in its nature such a fundamental civil right as is included in the meaning of the phrase "privileges and immunities." Three judges dissented. It has also been held that the prohibition of the sale of liquor or its regulation is a matter of state legislation; that the right of a woman to practice law in the state courts did not depend on U. S. citizenship, and could not be enforced by U. S. courts, and that the right to vote is not of necessity a privilege belonging to all U. S. citizens.

PRIVY-CHAMBER, Gentlemen of the, officers of the royal household of England, instituted by king Henry VII., to attend on the king and queen at court, and in their progresses, diversions, etc. For a number of years past no services have been required of these officers, and no salary or fee is attached to the office. There are also four gentlemen ushers of the privy-chamber, who are in regular attendance on the sovereign, waiting in the presence-chamber, and attending on the royal person; they have the honor of conducting her majesty in the absence of the higher officers.

PRIVY-COUNCIL (*Consilium regis privatum*), an assembly of advisers on matters of state appointed by the sovereign. The privy-council of England existed at a very early period in the history of the country. It was in its beginning a small permanent committee, or minor council, selected by the king out of the great council, or parliament;

and in its powers were included—what still forms one of its functions—the right to inquire into all offenses against the state, and to commit offenders for trial before the proper courts of law. It also frequently assumed the cognizance of questions of private right, a practice against which the statute 16 Charles I. c. 10 was directed, enacting that neither king nor council should have any jurisdiction in matters regarding the estates and liberties of the subject, which should be tried in the ordinary tribunals of the country. The council, in early times, consisted of the chancellor, the treasurer, the justices of either bench, the escheaters, the sergeants, some of the principal clerks of the chancery, and other members nominated by the king, who were generally bishops, earls, and barons. The star-chamber and court of requests were both committees of privy-council. The number of members, which had originally been 12, was gradually increased; and when the large number had become inconvenient, the sovereign sought the advice of a select body of the more influential among them. Charles II. limited the number of councilors to 30, 15 of whom comprised the chief officers of state and the *ex-officio* members, to whom were added 10 peers and 5 commoners named by the sovereign; and it was intended that the council, thus remodeled, should practically resume its original duties, and have the control of every part of the executive administration. The court of privy-council has, however, long ceased to discharge the function of advising the crown on the general affairs of government and state policy, a select number of the body, under the denomination of the cabinet council, forming the recognized executive council of the crown. See MINISTRY. The list of privy-councilors now includes the members of the royal family, the archbishops of Canterbury and York, the bishop of London, the great officers of state, the lord chancellor and judges of the courts of equity, the chief-justices of the courts of common law, the ecclesiastical and admiralty judges, and the judge-advocate, several of the puisne judges, the speaker of the house of commons, the ambassadors, some of the ministers plenipotentiary and governors of colonies, the commander-in-chief, the master-general of the ordnance, the first lord of the admiralty, and generally also a junior lord of the admiralty, as well as necessarily all the members of the cabinet. The vice-president of the board of trade, the paymaster of the forces, and the president of the poor-law board are also generally members of the privy-council, and sometimes other persons who have filled responsible offices under the crown. It is now understood that no members attend the deliberations of council except those who are especially summoned. In ordinary cases, only the ministers, the great officers of the household, and the archbishop of Canterbury are summoned; but on some extraordinary occasion summonses are sent to the whole council—this was last done to receive her majesty's communication of her intended marriage. Meetings of council are usually held at intervals of three or four weeks at her majesty's residence, and the attendance of six privy-councilors at least, with one of the clerks of council, is considered necessary to constitute a council.

A privy-councilor must be a natural-born subject of Great Britain. The office is conferred by the sovereign's nomination, without any patent or grant, and completed by taking the oath of office. The duties of a privy-councilor, as defined by this oath, are, to the best of his discretion, duly and impartially to advise the king; to keep secret his counsel; to avoid corruption; to strengthen the king's council in all that by them is thought good for the king and his land; to withstand those who attempt the contrary, and to do all that a true councilor ought to do to his sovereign lord. The office of privy-councilor formerly fell by the demise of the crown; but by 6 Anne, c. 7, the privy-council continues to exist for six months longer, unless sooner determined by the successor. Immediately on the decease of the sovereign, the privy-council now assembles and proclaims his successor, the lord-chancellor affixing the great seal to the proclamation. The members of the privy-council are then resworn as council of the successor and take the oath of allegiance, after which a privy-council is held, and the sovereign makes a declaration of his designs for the good government of the realm, and subscribes the requisite oaths.

The king in council, or a committee of the lords of council, have been empowered by various statutes to issue orders which are to have the force of law, parliament thus delegating its authority to regulate such matters as may be more conveniently regulated by order in council. In cases of extreme public emergency, at a time when parliament was not sitting, orders in council have sometimes been issued in contravention of the existing law, and the indemnification of parliament has afterward been sought. See ORDERS IN COUNCIL. The sovereign, with the advice of the privy-council, is also empowered to issue proclamations, which, however, must be in accordance with, and in furtherance of, the law of the land. See PROCLAMATION.

Almost every act of importance done by the sovereign in person is performed in council—such as declarations of, or public engagements by, the sovereign, and consent to marriages by members of the royal family. Among the functions of the privy-council are also the appointment of sheriffs in England and Wales, and the issuing of orders for the laying on or removing of quarantine, or for granting reprisals, or for embargoes. The sovereign in council has still more ample authority in all that relates to the colonies, including the making and enforcing of laws in such colonies as have no representative assemblies, and approving or disallowing the legislative acts of such as do possess them.

A large part of the business of the privy-council is transacted by committees, to which petitions and other matters are submitted by the queen in council. Among the permanent committees of privy-council are the board of council for trade and foreign plantations (see TRADE, BOARD OF); the committee of council for education, appointed in 1839, to distribute the sum voted annually for educational purposes; and the judicial committee of privy-council. This last-named committee consists of the keeper of the great seal, the chief-justices, the master of the rolls, the chief baron, and other great judicial officers, with any two other privy-councilors who may be named by the sovereign. It was established by 3 and 4 Will. IV. c. 41, for the purpose of deciding certain questions of right or privilege, particularly with regard to the colonies, and hearing appeals in certain classes of cases, which, notwithstanding the above-cited act of Charles I., still fell under the jurisdiction of the privy-council. Among these are appeals from the courts of equity, colonial appeals, both at common law and in equity, as also those causes which, prior to its abolition by 2 and 3 Will. IV. c. 92, were reviewed by the court of delegates (see DELEGATES, COURT OF); as the supreme court of appeal in ecclesiastical and maritime cases. The powers of the judicial committee of the privy-council have been enlarged and regulated by 6 and 7 Vict. c. 38. The powers possessed by the general board of health, instituted by 11 and 12 Vict. c. 18, and 17 and 18 Vict. c. 95, are now, by 21 and 22 Vict. c. 97, vested in the privy-council. The acts of committees of the privy-council are designated acts of the lords of the council, in contradistinction from orders in council, made by the sovereign, who is personally present, by advice of the privy-council. The crown may refer to a committee of council any petition or claim of right for which the ordinary tribunals afford no remedy. The lords of council constitute a court of record for the investigation of offenses against the state, the offenders being committed for trial before the ordinary tribunals. Certain state investigations, not of a criminal kind, have also been held to fall within their jurisdiction, such as the inquiry into the insanity of George III., the claim of queen Caroline to be crowned as consort of George IV., and questions regarding illegal marriages of the royal family.

The privy-council is styled collectively "her majesty's most honorable privy-council." Privy-councilors are entitled to the designation "right honorable" prefixed to their name, and take precedence next after knights of the garter. The personal security of a member of privy-council was formerly guarded by certain statutes, visiting with fine a blow struck in his house or presence, and making it felony to conspire against him or assault him in the execution of his office; but these immunities were done away with by 9 Geo. IV. c. 31.

The lord president of the council is the fourth great officer of the state, and is appointed by letters-patent under the great seal. The office is very ancient, and was revived by Charles II. in favor of the earl of Shaftesbury.

Scotland possessed a privy-council, which was merged in that of England by 6 Anne, c. 6. There is a privy-council for Ireland, which at present consists of 58 members, who are sworn pursuant to a sign-manual warrant directed to the lord lieutenant.

PRIVY-COUNCIL (COMMITTEE OF) **ON EDUCATION.** Till within the last forty years primary education in England was left in the hands of individuals and societies. The only societies of importance which endeavored to overtake the enormous educational destitution which prevailed were the British and foreign school society, founded under the patronage of George III.; and the national society, of more recent date. The first-mentioned society endeavored to get rid of all religious difficulties by avoiding the use of catechisms in the school, and confining themselves to the use of the Bible alone. The church party, however, felt that in accepting for the children of the country a religious training so vague, they were untrue to their principles, and would probably fail to secure for the young any efficient religious instruction at all. Accordingly, the national society was set on foot as a specially church institution. The object of both these societies was, by means of contributions collected from benevolent persons, to aid in the foundation and maintenance of elementary schools throughout England and Wales.

The prevailing destitution was, however, too widespread to be met by voluntary associations, and it consequently became necessary that the state should take some share in the education of the people. Parliamentary grants of small amount were made, which were distributed by the treasury under regulations issued in 1833, the chief of which was as follows: "That no application be entertained by the treasury unless a sum be raised by private contribution equal, at least, to one-half of the total estimated expenditure." These grants were for the purpose of erecting school-buildings. In 1839, after considerable opposition, it was resolved to increase the parliamentary grant, and to appoint a committee of her majesty's privy-council to administer it. On June 3, 1839, an order of council laid down that the grants of previous years not yet appropriated, as well as the grant for the current year, should be expended for the erection of schools, and that £10,000 voted for normal schools in 1835 should be given in equal proportions to the British and foreign and the national societies. The privy-council committee did not at first contemplate aiding any schools but those in connection with the two societies which we have just named; but in September of 1839 they resolved to aid other schools, where special circumstances prevented their affiliation to the societies. In the course of a year or two it came practically to this, that *all schools* were aided *in which the Bible was daily read from the authorized version*

The various religious denominations, under the influence, partly, of the strong pecuniary inducement held out by the committee of council, now began to exert themselves to erect schools, and to claim state aid. The committee of council, seeing the large probable increase in the number of schools requiring to be maintained partially out of the state funds, had their attention specially directed to the principles of their administration and the conditions on which alone aid was to be granted. The first measure of importance was the appointment of inspectors of schools. These were appointed by her majesty; but the church of England was permitted to exercise a veto on those nominated for the inspection of church schools, and the dissenting education committees were allowed a similar privilege with reference to those nominated for dissenting schools. No school was to be admitted to government aid in any form which did not declare its willingness to submit to inspection. The next measure of importance was the determining of the conditions on which aid should be given, first, for the erection, and, secondly, for the maintenance of schools. Grants for the former purpose were given in proportion to the number of children to be educated and the amount of money raised by private contribution.

In 1846 the first step seems to have been made toward making grants for the *maintenance* of schools. It was resolved to apprentice promising boys and girls, the young persons (who were to be at least thirteen years of age on appointment) giving assistance in the school-work, and receiving separate instruction for one hour and a half daily from the principal teacher.

They were paid salaries rising from £10 by annual increments of £2 10s. to £20. The teacher received a small extra payment for giving this instruction. The subjects were defined in a broad-sheet prepared by the department, and embraced Euclid, algebra, and the common subjects taught in schools. The apprenticeship was intended to be five years in length; but, in cases of exceptional ability, the period was considerably shortened. These young people were called "pupil-teachers."

In contemplation of the close of the apprenticeship of pupil-teachers, it was further resolved to grant them a scholarship or bursary, to enable them to pursue their studies at one of the numerous male and female normal schools which had come into existence; and at the conclusion of their training, to allow a grant of money to the normal school to which they had resorted. The queen's scholarship, as the bursary was called, was fixed at £25 for a first class, and £20 for a second, was tenable for two years; and the grants to the normal school at £20, £25, and £30, according as they had trained the student for one, two, or three years—two-thirds of these sums being allowed in the case of female students. It was further necessary to contemplate the completion of the normal-school training, and to endeavor to secure for the public service the well-trained teachers who had been educated at the public expense. Accordingly, it was resolved to grant to teachers sums ranging from £15 to £30 per annum (and two-thirds of these sums in the case of females), provided the school-buildings in which they taught, and the character of their teaching were satisfactory to her majesty's inspectors. A condition, afterward added, was, that the teacher should receive from local sources, including school-fees, not less than twice the amount paid by government, of which one-half should be from voluntary subscriptions. The amount which the teacher might claim, besides being payable only on the conditions stated above, was made partially dependent on the grade of certificate obtained at the normal school. Certificates are also granted on conditions specified in the code which is issued annually by the department.

What is known as "the new code" was introduced by Mr. Robert Lowe in 1862. It has undergone alterations every year; but it still continues to be founded on the principle of "payment by results." The teachers receive no direct payment from the department, but are left to make their own conditions with their managers. A grant is paid for every child's average attendance (6s.); and further payments are made for success in reading, writing, and arithmetic (3s. for each pass). To encourage a higher course of instruction, a further grant of 4s. on the average attendance is paid if the children are satisfactorily taught in two subjects (selected from geography, grammar, history, and needle-work); and extra sums are given for success in Latin. French, English literature, science, etc. The grants are paid to the managers, and the distribution is left entirely in their hands. Pupil-teachers must now be 14 years of age on appointment, and are apprenticed for not more than four years.

These are the principles of administration which continued to regulate the action of the privy-council, up to the date of the English education act of 1870, and the Scotch education act of 1872. The consequence has been an astonishingly rapid increase in the number of primary schools and normal schools or colleges; of the latter, there are about 40 in England and Scotland.

The above sketch of the privy-council system applies also to Scotland, with this difference, that when the revised code was first issued, the opportunity was regarded as a favorable one for considering whether there were not peculiarities in the educational system of Scotland, which might make it advisable either to separate educational administration there from that of England, or to found a national system on the basis of the time-honored system of parochial schools—excellent in themselves, but too few to supply the wants of the country. With these objects in view, a royal commission was issued in 1864, to take evidence on the whole question as it affected Scotland, and this commission reported in 1868. The education act of Scotland has separated the public schools—and in some cases the burgh schools—from their connection with the ecclesiastical bodies of the country, and placed them in the hands of elected school-boards. Privy-council grants are now paid to these boards, since the passing of the last act.

The minutes of the privy-council committee, or, as it is now called, "the education department," are constructed under the education acts above referred to; but they do not materially differ in principle from the code of 1863. There was up to 1878 a Scotch educational department in London, with a board in Edinburgh; but the latter is now abolished, while the former has been strengthened with additional powers. The codes which regulate the elementary schools of England and Scotland are now almost indentical; and the alterations made yearly seem to indicate the opinion of the department that the primary instruction of the whole country should be conducted on the same lines.

PRIVY-PURSE, Keeper of the, an officer of the royal household charged with the payment of the private expenses and charities of the sovereign.

PRIVY SEAL, the seal appended to grants which are afterward to pass the great seal, and to documents of minor importance which do not require the great seal. The officer who has the custody of the privy seal was at one time called the keeper, and afterward the lord privy seal. As early as the reign of Edward III. he was a member of the king's council, and a responsible minister of the crown. The lord privy seal is now the fifth great officer of state, and has generally a seat in the cabinet. His office is conferred under the great seal during pleasure. Since the reign of Henry VIII. the privy seal has been the warrant of the legality of grants from the crown, and the authority for the lord-chancellor to affix the great seal. Such grants are styled letters-patent, and the office of the lord privy seal is one of the departments through which they must pass to secure their validity. Until recently, all letters-patent for the grant of appointments to office under the crown, of patents of invention, charters, naturalizations, pensions, creation of honors, pardons, licenses in mortmain, etc., required to pass from the signet office to the privy seal office, in the form of signet bills, verified by the signet seal and superscription, and the signature of the clerk of the signet. These signet bills were the warrant for the privy seal; and on the privy seal being attached to them they were forwarded to the lord-chancellor, by whom the patents were engrossed and completed in the office of the great seal. The statute 11 and 12 Vict. c. 82 abolished the signet office, and enacted that warrants under the royal sign-manual prepared by the attorney-general and solicitor-general, setting forth the tenor and effect of the letters-patent to be granted addressed to the lord-chancellor, and countersigned by one of the principal secretaries of state, should be a sufficient authority for the privy seal being affixed; and that the sign-manual so signed, countersigned, and sealed, should be sufficient warrant to the lord-chancellor to pass letters-patent under the great seal. This statute abolished the previously-existing offices of clerks of the signet and clerks of the privy seal.

There is a privy seal in Scotland, which is used to authenticate royal grants of personal or assignable rights. Rights, such as a subject would transmit by assignation, are transmitted by the sovereign under the privy seal.

PRIZE-COURT is a court which adjudicates the property in vessels captured at sea from a belligerent; and the rule is, that when a captor brings home a prize, the tribunal of his own country has jurisdiction to declare whether he is entitled to it, which decision is binding everywhere. A prize-court differs from other courts in this, that the property of foreigners is brought within its jurisdiction, not by consent, as is implied with regard to the ordinary municipal courts, but by force. By natural law, one would suppose that the tribunals of the captor's country are no more the rightful exclusive judges of captures in war, made on the high seas from under the neutral flag, than are the tribunals of the neutral country. Nevertheless, such is the rule of international law, which vests this jurisdiction in the prize-court. In Britain the court is created by commission under the great seal, and the judge of the admiralty court is usually appointed. Lord Stowell was the judge during the French war, and, during the time he sat as judge, delivered many important judgments in this difficult branch of the law.

PRIZE, PRIZE-MONEY, terms having reference to property captured from an enemy, or to enemy's property captured from a neutral in time of war. The circumstances under which such capture is justifiable are stated under Capture, as regards naval operations; military prize and its distribution to the army are described under Booty. It remains only, therefore, to notice the procedure taken in respect to vessels and property captured by the navy. On a ship being taken, she must be sent to a port belonging to the capturing power, where the court of admiralty, on full evidence, adjudicates whether she be lawful prize or not. If the decision be affirmative the prize is then sold; or if a ship-of-war, a certain allowance per gun is granted by the state. The produce of the sale or grant is lodged in the hands of the accountant-general of the navy for distribution to the officers and men who assisted at the capture. The net produce of the sale or grant is first divided ratably among any ships (if there be more than one) concerned in the capture. The share of each ship is then divided into eight equal parts. If she were employed under the orders of a flag-officer, he gets one-eighth, and the captain two-eighths; if not, the captain has three-eighths; one-eighth is divided among the lieutenants and officers of corresponding relative rank; one-eighth is shared by the junior commissioned officers and warrant officers; one-eighth goes to the midshipmen and petty officers; and the remaining two-eighths among the seamen, marines, and boys.

PRIZE, PRIZE-MONEY (*ante*). The main causes for condemning a ship whose nationality is doubtful are the want, falsification, or destruction of the ship's papers; suspicious conduct of the ship's officers, or their refusal or inability to give a satisfactory account of the ship or cargo. A ship is presumed to belong to the nation whose flag it carries. Where a capture is made by one ship belonging to a squadron, all ships belonging to the squadron are entitled to share in the prize, whether they were in sight or not; and all ships of war unattached to a squadron share in a prize made by another ship of war in sight. Formerly captors secured title by keeping possession of the captured property 24 hours, and recaptors of it after that time got an absolute ownership. At present recaptors have only a right to salvage. It is doubtful if the crew of a vessel who recapture it before it is condemned are entitled to salvage. In the United States they are probably not so entitled. By the U. S. neutrality laws, established 1793, no armed vessel of a foreign belligerent is allowed to follow a vessel of another belligerent out of a U. S. harbor within 24 hours.

Prize-money is distributed in the United States in accordance with the provisions of the act of June 30, 1864, sec. 10. This statute directs that where the prize is equal or superior in force to the capturing vessel or vessels, the captors shall have the whole; where it is inferior in force, the captors shall have half, and the United States the other half. In the cases of letters of marque and privateers, the captors shall have the whole, unless otherwise stipulated in the commissions issued to such vessels. Prize-money decreed to captors shall be distributed in the following order: 1. To the officer commanding the fleet or squadron $\frac{1}{20}$ of the prize-money decreed to any vessel under his immediate command. 2. To the commanding officer of a division of a fleet or squadron on duty under orders of the commander-in-chief of such fleet or squadron, a sum equal to $\frac{1}{50}$ of the prize-money awarded to any vessel of his division for a capture made while under his command, said $\frac{1}{50}$ to be deducted from the $\frac{1}{2}$ due the United States, if such $\frac{1}{2}$ be due, and if not, from the sum decreed to the captors. Said $\frac{1}{50}$ is not to be added to the share such commander may be entitled to, and may take, instead, as commander of a single vessel, making or aiding in the capture. 3. To the fleet captain $\frac{1}{100}$ part of all prize-money decreed to any vessel or vessels in the squadron to which he is attached, unless the capture be made by the vessel to which he is attached when such capture is made. In that case he is to share, in proportion to his pay, with the other officers and men serving on such ship, according to subsequent provisions. 4. To the commander of a single vessel, $\frac{1}{10}$ of all prize-money decreed to such vessel under his command, if such vessel, at the time the capture was made, were under the command of the commanding officer of a fleet, squadron, or division, and $\frac{3}{20}$ if such vessel were not under the command of such superior officer, but acted independently. 5. After the deductions above mentioned, the residue shall be distributed in proportion among all those on duty (including the fleet captain), on board, and put on the ship's books proportionate to their respective rates of pay in the service. No commanding officer of a fleet or squadron is entitled to any share in a prize captured by any vessel or vessels not under his command, nor in any prize made by any vessel or vessels, which it was intended to place under his command, but which, at the time the capture was made, were not actually under his orders. No commanding officer of a fleet or squadron, who has left the station where he commanded, shall be entitled to any share in such prizes as may be made remaining in the station where he commanded, after he has left such station, nor after the command of such station has been assumed by his successor. No officer or other person, temporarily absent on duty from a vessel upon whose books his name remains, during his absence shall be deprived, on account of such absence, of any prize-money to which he would otherwise be entitled; but shall share in all prizes made by the vessel to which he is attached, until he is regularly discharged. See BLOCKADE, CONTRABAND, NEUTRALITY, PRIVATEER.

PRIZ'ZI, a t. of Sicily, in the province of Palermo, and 30 m. s. by e. from Palermo. It is of considerable commercial importance. Pop. '71, 8,885.

PRO'A, commonly known as the "flying proa," is a peculiarly-shaped canoe in use by the natives of the Eastern archipelago, and especially by the Ladrone pirates. It is about 30 ft. in length by 3 in width, and has the stem and stern equally sharp, so as to sail backward or forward without being turned round. One side is flat, and in a straight line with the stem and stern; the other side is rounded as in ordinary boats. This peculiar formation would make it liable to be easily upset, were it not for a framework which projects to windward, supporting a weight which counterbalances the pressure of the wind on the sail. The sail resembles the ordinary lug-sail, and is formed of mat. Slight variations from this form are found, but the principle of construction is the same.

PROB'ABILISM (Lat. *probabilismus*, a barbarous technical word, from *probabilis*, probable), in Roman Catholic theology, means the doctrine regarding the use of so-called "probable opinions" in guiding the conscience as to the lawfulness or unlawfulness of any particular action. The word came prominently into discussion in the 17th c., and seems now fully accepted as a technical name. As the ground of the doctrine, it is assumed that, in human actions, absolute certainty is not always attainable as to their lawfulness or unlawfulness. Short of this certainty, the intellect passes through the stages of "doubt" and of "probability." In the former, it is swayed between conflicting views, so as to be unable to decide, or even to approach toward deciding, what is true. In the latter, although there is a conflict of views, yet the reasons in their favor are not so equal that the intellect cannot see preponderating motives in favor of the truth of one or of the other. Moreover, in the conflict of views, another element will arise, as to their comparative "safety," that is, the greater or less danger of moral culpability which they involve; and this greater or less moral "safety" of a view may, or may not, coincide with its greater or less "probability." The doctrine of "probabilism" is founded upon these distinctions; and it presents itself in four different schools, all of which agree in professing that it it is lawful, in certain cases, to act upon opinions which are merely "probable." Opposed to all these four, is the school of *anti-probabilism*, which rejects altogether the use of probable opinions, and requires that an opinion shall be absolutely morally certain, in order that it may be lawful to act upon it. The four schools of probabilism are called: *probabilism simple*, *æqui-probabilism*, *probabiliorism* (from *probabilior*, more probable), and *tutiorism* (from *tutior*, more safe). The first holds that it is lawful to act upon any probable opinion, no matter how slight its probability. The second requires that the opinion shall be "solidly probable," but holds that, provided it be really probable, it is lawful to act upon it, even though the conflicting opinion should be equally probable. The third, in the conflict of probable opinions, will only permit us to act on the more probable of the two; but permits this even when the less probable adverse opinion is the "more safe." The fourth requires that in all cases the more safe opinion shall be followed, even when the less safe opinion is much the more probable. It is commonly said that the system of probabilism is modern; but this is only true of the discussions regarding it, for the doctrine itself, in some of its forms, is as old as the study of ethics, even considered as a moral science. The disputes regarding it arose with the science of casuistry, when men, in the 16th and 17th centuries, began to reduce morals to a system. It formed a leading subject of the controversy between the Jesuits and the Jansenists, although it is a great, while it is a very common, mistake to suppose that all the Jesuists were probabilists, and that all the Jansenists were opposed thereto. Very few Jesuists, indeed, were of the school which is chiefly assailed in the *Provincial Letters* (see PASCAL), that of probabilism simple. Without entering into the history of this very curious controversy, it will be enough to say that the Roman church, while condemning the two extremes—the extreme of anti-probabilism, which excludes all use even of the most probable opinions, and the lax extreme of simple probabilism, which accepts even the slightest probability as sufficient—has left the intermediate opinions for free discussion. The great modern master on the subject is St. Alfonso da Liguori, whose system may be described as a kind of practical probabidiorism, in which, by the use of what are called reflex principles, an opinion which *objectively* is but probable, is made *subjectively* the basis of a certain and safe practical judgment. There can be no doubt that the system of probabilism has been pushed by some individual divines to scandalous extremes; but it is only just to add that these extremes have been condemned by authority in the Roman church; and that, on the other hand, the principles of the higher Roman schools of probabilism are substantially the same as those of all moralists, whether of the old or of the new schools of ethics.

Protestants, however, and with them some Roman Catholics, reprobate probabilism in all its *schools* or forms, as a mere scheme for the delusion of conscience and excuse or justification of immorality. They maintain the Scriptural or Christian rule, and the only rule of true morality, to be that no man is entitled on any account to do that of which he doubts whether it is contrary or agreeable to the law of God. Every man must often choose between two courses, as to which is the most expedient; but this they hold to be a totally different thing, It is also urged against the probabilists, that they make the authority of *doctors*, or learned theologians, sufficient justification for a man's doing that which otherwise he would deem it unlawful to do; asserting that it will keep him safe at the judgment seat of God.

PROBABILITY, THE MATHEMATICAL THEORY OF. Of all mathematical theories which can be made in any sense popular, this is perhaps the least generally undertood. There are several reasons for this curious fact, of which we may mention one or two. *First.*—As by far the simplest and most direct elementary illustrations of its principles are furnished by games of chance, these have been almost invariably used by writers on the subject; and the result has been a popular delusion, to the effect that the theory tends directly to the encouragement of gambling. Nothing can be more false than such an idea. Independent of moral considerations, with which we have nothing to do here, no arguments against gambling can be furnished at all comparable in power with those deduced from the mathematical analysis of the chances of the game. *Second.*—In many problems, some of them among the easiest in the theory, the very highest resources of mathematics are taxed in order to furnish a solution. One reason is very simple. The solutions, however elementary, involving often nothing but the common rules of arithmetic, sometimes lead to results depending upon enormous numbers, and very refined analysis is requisite to deduce *easily* from these what would otherwise involve calculations, simple enough in character, but of appalling labor. Higher mathematics here perform, in fact, something analogous to *skilled labor* in ordinary manufactures. The simplest illustration of this is in the use of LOGARITHMS (q.v.), which reduce multiplication, division, and extraction of roots to mere addition, subtraction, and division respectively. Powerful as logarithms are, analysis furnishes instruments almost infinitely more powerful. The large numbers which occur in probabilities are usually in the form of *products*, and we may exemplify the above remarks as follows.

To find the value of the product 1 . 3 . 5 . 7, no one would think of using anything but common arithmetic; but if he were required to find the value of 1 . 3 . 5 . 7 . 9 . . . . . . 49, he would probably have recourse to logarithms, *merely to avoid useless labor of an elementary kind.* But in very simple questions in probabilities, it may be requisite to find (approximately) the value of a product such as 1 . 3 . 5 . 7 . 9 . . . . . . 23999—i.e., that of the first 12,000 odd numbers. No one in his senses would dream of attempting this by ordinary arithmetic, but it is the mere labor, not the inherent difficulty, which prevents him. Few would even attempt it by means of logarithms; for, even with their aid, the labor would be very great. It is here that the higher analysis steps in, and helps us *easily* to a sufficiently accurate approximation to the value of this enormous number. Thus, it appears that this objection to the study of the theory of probabilities is not applicable to their principles, which are very elementary, but to the mere mechanical details of the processes of solution of certain problems. *Third.*—There are other objections, such as the (so-called) religious one, that "there is no such thing as chance," and that "to calculate chances is to deny the existence of an all-ruling Providence," etc.; but, like many other similar assertions, these are founded on a total ignorance of the nature of the science; and, therefore, although pernicious, may be safely treated with merited contempt. The authors of such objections remind us of the Irishman who attempted to smash lord Rosse's great telescope, because "it is irreligious to pry into the mysteries of nature."

It appears to us that the best method of explaining the principles of the subject within our necessarily narrow limits, will be to introduce definitions, etc., as they may be called for, in the course of a few elementary illustrations, instead of elaborately premising them.

First Case.—The simplest possible illustrations are supplied by the common process of "tossing" a coin, with the result of "head" or "tail." Put H for head, and T for tail. Now, the result of one toss, unless the coin should fall on its edge (which is practically impossible), *must* be either

H or T.

Also, if the coin be not so fashioned as to be more likely to fall on one side than the other (as, for instance, is the case with loaded dice), *these events are equally likely;* or, in technical language, *equally probable.* To determine numerically the likelihood or the probability of either, we must assign some numerical value to *absolute certainty.* This value is usually taken as *unity,* so that a probability, if short of absolute certainty, is always represented by a proper fraction. Suppose that p (a proper fraction) represents the probability of H, then evidently p is also the probability of T, because the two events are equally likely. But one or other *must* happen; hence, the sum of the separate probabilities must represent certainty. That is,

$$p + p = 1, \text{ or } p = \frac{1}{2}.$$

Thus we have assigned a numerical value to the probability of either H or T, by finding what proportion each bears to certainty, and assigning to the latter a simple numerical value.

Suppose, as a contrast, the coin to be an unfair one, such as those sometimes made for swindling purposes, with H on each side. Then we *must* have in one toss

H or H;

i.e., H is *certain,* or its probability is 1. There is no possibility of T, and therefore its probability is 0. Absolute impossibility is therefore represented by the numerical value of the probability becoming zero.

Second Case.—Suppose a "fair" coin to be tossed twice in succession. The event *must* be one of the four:

H, H; H, T; T, H; or T, T.

Now all four are evidently equally likely: i.e., their probabilities are equal. But one of them *must* happen—hence the sum of their probabilities amounts to certainty, or 1. That is, each of the four cases has a probability measured by the fraction $\frac{1}{4}$.

Here we may introduce a new term. What are the *odds* against H, H? The answer is, the chance or probability of H, H is $\frac{1}{4}$; that is, *one* case in *four* is favorable, hence *three* are unfavorable, and the odds are said to be 3 to 1 against the event. *In general the odds against any event is the ratio of the probability that it will not, to the probability that it will happen.*

Thus, in the first case above, the odds against H in one toss are even.

Third Case.—What is the chance of throwing both head and tail in two tosses of a coin? Remark that this is *not* the same question as, "What is the chance of head followed by tail, in two tosses?" The latter question was answered in the *second case*, for the chance of H, T was there shown to be $\frac{1}{4}$. The present event contemplates *either* H, T, or T, H—and its probability is therefore $\frac{1}{4}+\frac{1}{4}$, or $\frac{1}{2}$, since each has the separate probability $\frac{1}{4}$. Or we may reason thus: Of the four possible cases of two tosses of a coin, *two* give both head and tail—*all four* are equally probable—hence the probability is 2 in 4, or 1 in 2; i.e., $\frac{1}{2}$.

Fourth Case.—What is the chance of throwing H in two tosses? Remark that this is *not* the same question as "What is the chance of H *once only* in two tosses?" The latter question is that of the third case merely put in a different form. Nor will it do to answer our question thus:

$$\text{Chance of H in first throw} = \frac{1}{2}.$$

$$\text{Chance of H in second throw} = \frac{1}{2}.$$

Therefore chance of H in two throws $=\frac{1}{2}+\frac{1}{2}=1$. For by this reasoning it would appear that we *must* get head once at least in two throws; which is obviously absurd, for we may have T, T.

This very elementary example shows how delicate the reasoning in this subject is, and how liable one is to make (complacently) the most preposterous mistakes.

The error of the above process is introduced by the fact that we have not considered that *if H be obtained in the first throw, our object is attained, and no second throw is required.* The correct work is this:

$$\text{Chance of H in first throw} = \frac{1}{2}.$$

If H come, the game is finished.

$$\left.\begin{array}{ll}\text{Chance of T in the first throw, in which case we must throw again,} & =\frac{1}{2}\\ \text{Subsequent chance of H in second throw} & =\frac{1}{2}\end{array}\right\}$$

Combining these, we have:

$$\begin{array}{ll}\text{Chance of H at second throw } \textit{only} = \frac{1}{2}\times\frac{1}{2} & =\frac{1}{4}.\\ \text{Add chance of H at first throw} & =\frac{1}{2}.\\ \text{Sum, or chance of H in two throws} & =\frac{3}{4}.\end{array}$$

A simpler method is this: The possible throws, all equally likely, are, as before,

H, H; H, T; T, H; and T, T.

The first three of these satisfy the requirements of the question; i.e., the required event has 3 chances in 4 in its favor, or its probability is $\frac{3}{4}$.

Fifth Case.—The chance of H in any one throw is $\frac{1}{2}$ (by *first case*). The chance of H, H is $\frac{1}{4}$ (*second case*). Now $\frac{1}{4}=\frac{1}{2}\times\frac{1}{2}$; i.e., the chance of *the joint occurrence of two independent events*, at least in this simple case, *is the product of their separate probabilities.* Contrast this with the principle, already several times employed, that *the probability of an event which may arise from one of a number of causes* (*no two of which can co-exist*) *is the sum of the separate probabilities.* Simple proofs of these statements, in all their generality, will now be given, along with various other important propositions.

(A.) If an event may occur in p ways, and fail in q ways—all being equally likely—the probability of its happening in one trial is $\frac{p}{p+q}$, and of its failing, $\frac{q}{p+q}$, and the odds in its favor are $p : q$.

The simplest way of conceiving this, and many other hypothetical cases, is to suppose *one* ball to be drawn from a bag which contains a number of balls, differing from each other in color, or in some other quality not distinguishable by the touch. Suppose the bag to contain p white balls (W), and q black ones (B), and *one* ball to be drawn; what is the chance of its being white?

Here there are p chances in favor of a white ball being drawn, and q chances against it—these being *all equally likely*, or having *equal probabilities*—the chance of W is therefore p in $p+q$; i.e., is expressed by the fraction,

$$\frac{p}{p+q}.$$

The chance against W is q in $p+q$, or

$$\frac{q}{p+q}.$$

And the sum of these fractions is 1, or certainty, as it ought to be—for the ball drawn *must* be either W or not W.

(B.) If an event may occur in p ways and fail in q ways, all being equally likely—what are the chances of (a) its happening twice, (b) its happening the first and failing the second, (c) its failing the first time and happening the second, and (d) its failing twice in two trials?

Taking the illustration in (A) above, we see that there are p independent ways of succeeding in the first case, and p in the second; hence there are $p \times p$, or p^2 independent ways of *succeeding* twice. For any one of the first p may occur along with any one of the second. But the whole possible number of ways of experimenting twice is $(p+q)(p+q)$, or $(p+q)^2$; hence, the

Chance of (a) i.e., succeeding twice, is $\frac{p^2}{(p+q)^2}$.

Similarly, chance of (b) is $\frac{pq}{(p+q)^2}$.

" " (c) is $\frac{qp}{(p+q)^2}$.

" " (d) is $\frac{q^2}{(p+q)^2}$.

The sum of these is $\frac{p^2+2pq+q^2}{(p+q)^2}=1$, as it ought.

(C.) An attentive consideration of (B) shows us that when we have the independent probabilities of two events, the probability that they will jointly occur is the *product* of their separate probabilities.

Thus, for W, in first trial, chance is $\frac{p}{p+q}$.

" " second " $\frac{p}{p+q}$.

Whose product is the probability of W in each of two successive trials.

Again, for W, in the first trial, chance is $\frac{p}{p+q}$.

" B, " second " $\frac{q}{p+q}$.

Whose product is $\frac{pq}{(p+q)^2}$; which is found above to be the chance of WB. And so on.

(D.) This may be generalized as follows—the process will be evident to all who can understand the very elementary algebra employed:

$$\text{Certainty}=1=\frac{(p+q)^n}{(p+q)^n}=\frac{p^n+np^{n-1}q+\frac{\overline{n.n-1}}{1.2}p^{n-2}q^2+\ldots\ldots+q^n}{(p+q)^n}$$

by the binomial (q.v.) theorem of Newton. Now the *parts* of this expression—i.e.,

$$\frac{p^n}{(p+q)^n},\ \frac{np^{n-1}q}{(p+q)^n},\ \ldots\ldots\ldots,\ \frac{q^n}{(p+q)^n}$$

represent, obviously, the chances of W n times, W $n-1$ times and B once, W $\overline{n-2}$ times and B twice, ..., B n times, in n trials, where the *order* of occurrence is not considered.

If the *order* be considered, the chance of any arrangement, such as WBWWBBBW, for instance, is evidently

$$\frac{p.q.p.p.q.q.q.p}{(p+q)^8}=\frac{p^4q^4}{(p+q)^8}.$$

But the chance of 4W and 4B in 8 trials, *without respect to order*, is as above, the term containing p^4q^4 in the expansion of $(p+q)^8$, divided by $(p+q)^8$—i.e.,

$$\frac{70\,p^4q^4}{(p+q)^8}.$$

To take a simple example: if there be 2W and 1B in a bag, and each ball be placed immediately after drawing, the chance of W 4 times in succession is $\frac{2^4}{3^4}=\frac{16}{81}$.

Of the particular combination WBWB, the chance is $\frac{2}{3}.\frac{1}{3}.\frac{2}{3}.\frac{1}{3}=\frac{4}{81}$.

But the chance of W twice and B twice, *without respect to order*, is $6\,\frac{2^2.1^2}{3^4} = \frac{24}{81}$; the numerator of the fraction being the term of $(2+1)^4$ which contains the product $2^2.1^2$.

(E.) From the preceding results it is obvious that *the probability of the joint occurrence of any set of independent events is the product of their separate probabilities.*

(F.) We may vary the process by supposing that there are *several* bags, each containing some balls, which may be white or black; but the number in each bag, and the proportion of white to black, being any whatever. *One* ball only is to be drawn, what is the chance that it is W?

If n be the number of bags, the chance that the ball will be drawn from any particular bag is $\frac{1}{n}$ [see (A)]. And if in that bag there be p of W and q of B, the chance that W will be drawn from it is $\frac{p}{p+q}$ [see (A)].

Hence the chance that W is drawn, and from the particular bag, is,

$$\frac{1}{n}.\,\frac{p}{p+q} \text{ by (E).}$$

And the whole chance that W is drawn is the sum of all the chances, $\frac{1}{n}.\,\frac{p}{p+q}$, for each of the bags.

Thus, let there be 5 bags, containing, respectively, WB, WW, BB, WWB, WWW; our chance is found as follows: The chance of the ball being drawn from any particular bag is $\frac{1}{5}$, since all are equally likely to be chosen. Then, supposing the first chosen, the chance of W is $\frac{1}{2}$; if the third be chosen, the chance of W is 0, etc. Hence, on the whole, the chance of W is

$$\frac{1}{5}\cdot\frac{1}{2}+\frac{1}{5}\cdot 1+\frac{1}{5}\cdot 0+\frac{1}{5}\cdot\frac{2}{3}+\frac{1}{5}\cdot 1=\frac{19}{30}.$$

(G.) Hence, *if an event may happen in consequence of any one of a set of causes, such that the action of one excludes that of the others; its probability is the sum of the products formed by multiplying the chance of the action of each cause by the chance that that cause, if operating, will produce the desired event.*

We might easily extend this very simple series of results, but our limits restrict us to an attempt to show more the *extent* of the subject than the details of its application to any particular set of questions. We therefore reluctantly pass to the consideration of an *inverse* problem or two.

(H.) An event has occurred, which may have arisen from any one of a set of mutually exclusive causes: to determine the probability that any particular cause was the efficient one—the probability of the event's happening, when any particular one of the causes operates, being known.

As a simple example will show us how to proceed in the most general case, take the 5 bags of (F) above. The chances of drawing W from them are, in order, $\frac{1}{2}$, 1, 0, $\frac{3}{2}$, 1. Suppose W *has* been drawn, what is the chance that it was drawn from any particular bag? It is obvious that the chance of W having been drawn from any particular bag is proportional to the chance that, if that bag had been selected, W would have been drawn from it. Hence, if p_1, p_2, p_3, p_4, p_5 be the chances that the several bags furnished the W actually drawn, we have

$$p_1 : p_2 : p_3 : p_4 : p_5 :: \frac{1}{2} : 1 : 0 : \frac{2}{3} : 1,$$

with the additional condition that the ball *must* have been drawn from one of the bags, and therefore

$$p_1 + p_2 + p_3 + p_4 + p_5 = 1.$$

From these, by elementary algebra, we have

$$p_1 = \frac{3}{19},\ p_2 = \frac{6}{19},\ p_3 = 0,\ p_4\ \frac{4}{19},\ p_5 = \frac{6}{19}.$$

And a very simple application of algebra will easily conduct us to the general formula for any such case.

(I.) If the nature of a cause is known only by its results, we have an interesting case of simultaneous application of the direct and inverse methods.

Thus a bag contains 3 balls, each of which may be either black or white. A ball has been drawn from it on two occasions—replacing before drawing—and on each of these occasions the ball was W. What is the chance that a third drawing will give a *black* ball?

The contents of the bag are obviously one of the following—viz. W.W,W; W,W,B; or W,B,B—since it contains *one* W at least. Now if WWW be the contents, the probability of the observed event (two W in succession) is 1 × 1 = 1.

If W,W,B, $\frac{2}{3}\times\frac{2}{3}=\frac{4}{9}$.

If W,B,B, $\frac{1}{3}\times\frac{1}{3}=\frac{1}{9}$.

Hence the probabilities that these are respectively, the contents of the bag are as $1:\frac{4}{9}:\frac{1}{9}$, or as $9:4:1$; and are therefore $\frac{9}{14}$, $\frac{4}{14}$, and $\frac{1}{14}$ respectively, since their sum must be 1 or certainty.

Now for the chance of B in the third drawing; if WWW be the contents $\left(\text{of which the chance is } \frac{9}{14}\right)$, the chance of B is 0. Hence we have one part of the chance for B, viz., $\frac{9}{14}\times 0=0$. Similarly, the other parts are $\frac{4}{14}\times\frac{1}{3}=\frac{4}{42}$, and $\frac{1}{14}\times\frac{2}{3}=\frac{2}{42}$. The whole chance of B in the third drawing is therefore

$$0+\frac{4}{42}+\frac{2}{42}=\frac{1}{7}$$

As exercises on the above principles, we will take first a few simple questions from life assurance, the subject to which, above all others, the elementary theory of probability has been of the most indispensable service. We purposely choose the very simplest that the subject can furnish, but they are quite sufficient to show the great value of the theory.

A table of mortality (q.v.) gives the numbers alive, at each successive year of their age, out of a given number of children born. If A_n and A_n+_1 be the numbers in the table corresponding to the nth and $\overline{n+1}$th years of age; the inference from the table is, that of A_n individuals now alive, and of n years of age, A_n+_1 will live one additional year at least. Hence, the chance that any one of them die during the year is

$$\frac{A_n-A_n+_1}{A_n}.$$

Call this $1-p$, then p is the chance that any one of them will survive the year.

Questions.—Of two individuals, one n years old, and the other n_1, what are the chances that

(*a.*) Only one lives a year?
(*b.*) One, at least, lives a year?
(*c.*) Both do not live a year?

Calling the individuals A and B, the chance of A living out the year is p, and the chance of dying within the year is $1-p$. For B these are p_1 and $1-p_1$. Hence

(*a.*) A lives and B dies—chance $p\,(1-p_1)$.
B lives and A dies—chance $(1-p)p_1$.

Hence answer to (*a*) is . . $p+p_1-2pp_1$.

(*b.*) This includes, in addition to the conditions of (*a*), the chance that *both* survive, which is pp_1.

Hence answer to (*b*) is $p+p_1-pp_1$.

(*c.*) In this case the chance that both *do* live a year is pp_1. Hence chance of (*c*) is $1-pp_1$.

As another very instructive example, let us take the question,

"In how many throws of a die is it even betting that an ace will be thrown?"

This may, of course, be worked directly, proceeding in the following manner:

Chance of ace in first throw $=\frac{1}{6}$.

Then, remembering that there is no second throw unless the first fails,

Chance of ace in second throw $=\frac{5}{6}.\frac{1}{6}$; and so on.

Hence the odds against ace in 1 throw are 5 : 1.
" " " 2 throws 25 : 11;

and so on. But great care is requisite in this mode of working the problem.

The simplest procedure is this:

Chance *against* ace in 1 throw $\frac{5}{6}$.
" " " 2 throws $\frac{25}{36}$.
" " " 3 " $\frac{125}{216}$
" " " 4 " $\frac{625}{1296}$.

Hence odds against ace in 1 throw 5 : 1.
" " " 2 throws 25 : 11.
" " " 3 " 125 : 91.
" " " 4 " 625 : 671.

That is, the odds are considerably *against* ace occurring in 3 throws, being about 11 to 8; while in 4 they are slightly in its favor, as 29 : 27 nearly. One is sure, therefore, of winning in the long run, if he can get any one to give him repeatedly an even bet against ace appearing in 4 throws of a die.

It is to be observed that when we say "*in the long run*," we mean that the most likely event may not be that which will happen in the first trial, nor perhaps for many trials (because, unless its probability is 1 or certainty, it is, of course, *possible* that it may never occur). But what is certain is this, that if a sufficient number of trials be made, we can have any amount of probability (short of certainty) that the ratio of the number of successful trials to the number of failures, will be in the ratio expressed by the odds in favor of success in any one trial.

And this introduces us to another department of the theory of probabilities, what is called *expectation*. We begin with a simple case, not involving what is called *moral expectation*, to which the next example will be devoted.

Suppose A, B, and C have made a pool, each subscribing £1; and that a game of *pure chance* (i.e., not dependent on skill) is to be played by them for the £3. What is (previous to play) the value of the expectation of each? By the conditions, all are equally likely to win the pool, hence its contingent value must be the same to each; and, obviously, the sum of these values must represent the whole amount in question. The worth of the expectation of each is therefore £1. That is, if A wishes to retire from the game before it is played out, the fair price which B or C ought to pay him for his share is simply £1. But this is obviously $\frac{1}{3} \times$ £3; i.e., the value of the pool multiplied by his chance of getting it. Here we have taken an extremely simple case, because we have not room for the general proof (though it is closely analogous to that just given) that

The value of a contingent gain is the product of the sum to be gained into the chance of winning it.

So far, it has been assumed that the payment of his stake (which may be wholly lost) has not *morally* affected the position of any of the players; i.e., that the stake is a sum whose loss would in no wise embarrass him. And it is only with such cases that the strict mathematical theory can deal; for we cannot estimate with mathematical accuracy the value of the stake as depending on the fortune (the *possessions*, not the *luck*) of the player. The attempts which have been made to supply this apparent deficiency in the theory have, of course, not been very generally accepted. Still there is no doubt that two men of very unequal fortunes are placed in very different circumstances when they have subscribed equal sums to a pool which they have equal chances of gaining. The most commonly received method of *approximating* to a solution of such a question (for it is obvious that here we have left mathematical certainty behind) is that proposed by Daniel Bernoulli; which is, that the value of a small gain, or the inconvenience of a small loss, is directly proportional to the amount of the gain or loss (which is probably correct), and inversely proportional to the fortune of the person affected (which may be nearly true, except in very extreme cases). The application of this hypothetical principle necessitates, in general, the use of the integral calculus; but, to show the *mathematical folly* of gambling, we quote one of Bernoulli's results:

A, whose whole fortune is £100, bets £50 even with B on an event of which the chance is $\frac{1}{2}$. What is the moral value of A's fortune after making the bet (and before it is decided)? By applying the above method, he finds it to be £87. Thus A, by making the bet, has depreciated by 13 per cent the value of his property. This is an extreme case, of course; and the method employed in obtaining the result is questionable; still, it is certain that no legitimate method could show that A had otherwise than impaired his fortune by entering upon any such transaction. This, of course, is on the supposition that the bet is a *fair* one; if A be a swindler, and get from B more than the proper odds against the event, he may, of course, improve to any extent the value of his fortune. But such would be a question of flats and sharpers, not a question of probability.

A very excellent example of *moral* as distinguished from *mathematical* probability is furnished by the famous "St. Petersburg problem."

A and B play at heads and tails. A is to pay B £2 if H comes at the first throw, £4 if at the second and not before, £8 if at the third, and not before; and so on, doubling each time. What should B pay (before the game) for his expectation?

Applying the mathematical method we see that

$$\text{Chance of H at first throw} = \frac{1}{2};$$

in which case B gets £2, of which the contingent value is $\frac{1}{2} \times$ £2 = £1.

$$\text{Chance of H at second throw, and } not \text{ before} = \frac{1}{4};$$

when B is to get £4, whose value is therefore $\frac{1}{4} \times £4 = £1$.

$$\text{Chance of H at third throw, and not before} = \frac{1}{8};$$

contingent value of B's £8 is therefore $\frac{1}{8} \times £8 = £1$. And so on, forever.

Hence B's expectation (mathematical) is £1 + £1 + £1 + etc., forever, or an infinite sum. Now it is obvious that no man in his senses would pay even a moderately large sum for such a chance. Here the *moral* expectation comes into play; but the mathematical solution is perfectly correct, if we interpret it properly. *It does not attempt to tell what will be the actual result in any one game—this is pure chance*—but it tells us what will be the average to which the results of larger and larger numbers of games *must* continually tend. In other words, if B had an inexhaustible purse, he might safely pay *any* amount to A before each game, *and be sure of winning in the long run*, after an indefinitely great number of games were played. But this, though theoretically exact, is not applicable to mundane gambling—where limited purses and limited time circumscribe the field requisite for the proper development of the mathematical result.

Before quitting this part of the subject, we may give a couple of instances in which the mathematical theory may be easily tested by any one who has a little leisure. One of these we will develop at length, as a final instance of the simple calculations generally involved:

"To find the chance of throwing any given possible number with two dice."

As the faces of the dice are numbered from 1 to 6, the smallest throw is 2, and the greatest 12.

In one throw the chances are—

$$\text{For } 2 = 1 + 1; \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36};$$

the probabilities being *multiplied* (E) because the events are independent. For

$$3 = 1 + 2, \text{ or } 2 + 1; \frac{2}{36}:$$

$$4 = 1 + 3,\ 2 + 2, \text{ or } 3 + 1; \frac{3}{36}:$$

$$5 = 1 + 4,\ 2 + 3,\ 3 + 2, \text{ or } 4 + 1; \frac{4}{36}:$$

$$6 = 1 + 5,\ 2 + 4,\ 3 + 3,\ 4 + 2, \text{ or } 5 + 1; \frac{5}{36}:$$

$$7 = 1 + 6,\ 2 + 5,\ 3 + 4,\ 4 + 3,\ 5 + 2, \text{ or } 6 + 1; \frac{6}{36}$$

Then, in the inverse order—

$$8 = 2 + 6,\ 3 + 5,\ 4 + 4,\ 5 + 3, \text{ or } 6 + 2; \frac{5}{36}:$$

and so on—the fact being that if we read the *lower* sides of the dice when the throw is 8, they will give 6, and so on—the sum being always 14.

The mathematical expectation for any one throw is therefore

$$\frac{1}{36} \cdot 2 + \frac{2}{36} \cdot 3 + \frac{3}{36} \cdot 4 + \frac{4}{36} \cdot 5 + \frac{5}{36} \cdot 5 + \frac{6}{36} \cdot 7 + \frac{5}{36} \cdot 8 + \frac{4}{36} \cdot 9 + \frac{3}{36} \cdot 10 + \frac{2}{36} \cdot 11 + \frac{1}{36} \cdot 12.$$

In all—

$$\frac{1}{36}(2 + 6 + 12 + 20 + 30 + 42 + 40 + 36 + 30 + 22 + 12); \text{ or } \frac{1}{36} \cdot 252 = 7.$$

The meaning of this is, *not* that we shall probably throw seven the first time, nor second, nor perhaps for many throws; but that if we throw a number of times, add the results, and divide by the number of throws, the final result will be more and more nearly equal to seven, the greater be the whole number of throws. It is very instructive to make the experiment, say on 100 throws of two dice, as in backgammon. If the mathematical result be not closely verified by such a trial, *the dice are loaded;* or, at least, are ill-made.

Another illustration, and a very excellent one, is furnished by the following theorem If the floor be ruled with equidistant parallel lines, and a straight rod, whose length is equal to the distance between any two contiguous lines, be dropped upon it at random, the chance of its falling on one of the lines is $\frac{2}{\pi}$, where π is the ratio of the circumference of a circle to its diameter (see QUADRATURE OF THE CIRCLE). The deduction of this result from the theory of probabilities requires the use of the integral calculus, and cannot be given here; but we may put the above theorem to the test of practice in the following way: Let the rod be tossed a number of times, then the greater this number, the more nearly shall we have

$$\frac{\text{Twice number of throws}}{\text{Number of times the rod falls on a line}} = \pi = 3.14159, \text{ etc.};$$

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and therefore, by simply continuing this process long enough, we may obtain as accurate a value as we choose of the ratio of the circumference to the diameter of a circle.

To show how the theory of probabilities would tend, if generally known, to the discouragement of gambling, would require a treatise—as every species of game would have to be treated—we shall therefore only take one case, about as bad a one as can be. This is when a man makes a "book" on a horse-race, so as to "stand to win," whatever be the result of the race. This is, of course, immoral; for, as it can make no matter who accepts his bets, suppose them all taken by one individual. The latter must therefore have been "done" into a complex transaction by which he is *certain to lose.* The method of making such a "book" is simple enough; it consists mainly in betting *against* each horse. Thus, if three horses, A, B, C, are to start, and he can get the following bets taken,

£4 : £3 against A,
£5 : £4 " B,
£6 : £5 " C;

his book stands thus:

If A win, he wins £4 + £5 − £4 or £5.
If B " " £5 + £3 − £5 or £3.
If C " " £4 + £3 − £6 or £1.

Now, to examine this case, suppose the *correct* odds to have been laid against A and B, what ought in fairness to be the odds as regards C?

$$\text{Chance of A winning is } \ldots\ldots \frac{3}{7}.$$

$$\text{" B " } \ldots\ldots \frac{4}{9}.$$

$$\text{Chance of A or B winning} = \frac{3}{7} + \frac{4}{9} = \frac{55}{63}.$$

Hence, chance of C winning $= \frac{8}{63}$; and therefore the legitimate odds against C are 55 to 8, whereas our betting-man has got a *fool* to accept 6 to 5.

The true cause of the detestation which attaches to gambling is not so much the ruin, insanity, suicide, etc., in which it not unfrequently ends, as the fact, that a gambler's work in no case increases the wealth or comfort of the state; all it can effect is a more or less rapid and dishonest transfer of these from one state of distribution to another. It is as useless, so far as regards production, as the prison-crank.

There is a common prejudice as to "*runs of luck,*" which are popularly supposed *not* to be compatible with the mathematical theory. This, also, is a complete delusion. To take a very simple case, the reader will easily see that, if he writes down all the possible cases which may occur in six tosses of a coin, the odds are 19 : 13 in favor of a run of three at least.

To give an instance of the principle of interpretation which we have several times above applied to the mathematical result—viz., that the greater the number of trials, the more nearly will the average result of these trials coincide with it—let us recur to heads and tails. Suppose a coin tossed 10 times, and let H^n stand for H n times, then we have

$$1 = \left(\frac{1}{2} + \frac{1}{2}\right)^{10} = \frac{1}{2^{10}}\left(1 + 10 + \frac{10.9}{1.2} + \frac{10.9.8}{1.2.3} +\text{, etc.}\right)$$

of which the terms are [as in (D)] the probabilities of H^{10}, H^9T, H^8T^2, etc., respectively; the order not being taken account of. The largest term is the 6th, and its value is $\frac{252}{2^{10}} = \frac{252}{1024}$, or about $\frac{1}{4}$. This is the chance of H^5T^5, without regard to order in ten throws. Although the most probable result, inasmuch as the chances of H^6T^4 and H^4T^6 are each about $\frac{1}{5}$ only, and those of the other possible combinations much smaller—yet it has not a very large chance. But the chance of a result *not deviating much from the most probable one,* is very much larger: in the above case, the chance of having not less than 3H, and not less than 3T, is as much as $\frac{912}{1024}$. But this tendency of the bulk of the results to coincide very closely with the most probable one, is much more evident as we take a greater and greater number of trials. Thus, in 100 trials with the coin, we have

$$1 = \left(\frac{1}{2} + \frac{1}{2}\right)^{100} = \frac{1}{2^{100}}\left(1 + 100 + \ldots + \frac{100.99.98\ldots.51}{1\;.\;2\;.\;3\ldots.50} +\text{, etc.}\right)$$

[*Now* we begin to see how the higher analysis comes in. Who is to work out by common arithmetic the value of the fraction $\frac{100.99.98\ldots.51}{1\;.\;2\;.\;3\ldots.50}$? Some calculating boy *might,* with no very enormous labor—but, wait a moment, we may wish to have the result of a million of trials, and what calculator (arithmetical) will tell us the value of

$$\frac{1,000,000 \times 999,999 \times \ldots\ldots\ldots \times 500,001}{1 \times 2 \times \ldots\ldots\ldots \times 500,000}?]$$

In this case, the most probable result is $H^{50}T^{50}$, without regard to order, but its chance is only about $\frac{2}{25}$. [The exact value is $\frac{1}{2^{100}} \cdot \frac{100.99.98\ldots\ldots\ldots 51}{1.2.3\ldots\ldots\ldots 50}$]. Had there been 1000 throws, the chance of $H^{500}T^{500}$ (the most likely combination) would have been about $\frac{1}{38}$. But, as the number of throws increases, the number of terms grouped close to the largest in the expansion, and whose sum far exceeds that of all the rest, becomes a smaller and smaller fraction of the entire number of terms. Hence the chance that in 1000 tosses there should not be more than 600 nor less than 400 H, is much greater than that of not more than 60 nor less than 40 H in 100 throws; and so on.

Thus it is that all our statistical results, say the ratios of the numbers of births, marriages, suicides, etc., to the whole population—or that of the male to the female births—or that of the dead letters to the whole number posted, etc.—though perhaps never the same in any two years, yet fluctuate between very narrow limits. And thus it is that the theory of probabilities has been the means of solidly establishing, beyond almost the possibility of failure, when properly applied, the inestimable securities afforded by life-assurance.

Another very important application of the theory is to the deduction of *the most probable* value from a number of observations (astronomical, meteorological, etc.), each of which is liable to error. We may confidently assert that, but for this, astronomy could not have taken the gigantic strides by which it has advanced during the present century. But the "*method of least squares*," as it is called, which is furnished for this purpose by the theory of probabilities, is far beyond the scope of elementary mathematics, and can therefore only be referred to here. Its fundamental features may be seen in the above process of determining the probability that the result of a number of trials shall lie within certain limits on each side of the most probable result.

The theory of probabilities has been applied to many other important questions, of which we may mention only two—the value of evidence, and the probability of the correctness of the verdict given by various majorities in a jury. But for these, and for the further development of what we have given above from the simplest points of view, we must refer to the various treatises on the subject. Of these, the most accessible to an English reader are the very valuable works of Galloway and De Morgan. Poisson, Gauss, and especially Laplace, have also treated the subject in the most profound manner. But the difficulty of understanding Laplace's great work is such that few have ever mastered it completely; and it is therefore particularly satisfactory that the late prof. Boole in his *Laws of Thought*, has shown how to dispense with a great part of the analysis which renders Laplace's work so formidable.

PROBATE COURT is a court created in England in 1858, in lieu of the old prerogative courts, to exercise the exclusive jurisdiction in all matters touching the succession to personal estate. Since the judicature acts of 1873–75 the probate court is included in the probate, divorce, and admiralty division of the new high court of justice. If a man at his death leaves a will, then it must be produced and verified, so to prove that it is an authentic will, duly executed and signed in presence of witnesses, and therefore that the right to the personal estate is vested in the executors named by the will. The will is sworn to by the witnesses, on being produced; and if the evidence is satisfactory, it is registered, and the original deposited in the court, when copies are made. This process is called proving the will, and the act of court is called the probate of the will. If there is no will, then the rule being, that the personal estate devolves on the next of kin and widow, if any, it is necessary that an application be made to the court to appoint one of the next of kin to be the administrator, and take charge of the payment of debts. This is called taking out administration, and the act of the court appointing the administrators is called letters of administration. Numerous difficulties often arise as to irregularities in the making of wills and as to the party entitled to administration, and it is the function of the court of probate to dispose of these.

PROBATE COURT (*ante*) is called in some states orphans' court, in others surrogate court; and in many of the southern states the probate functions are exercised by a county officer called the ordinary, the name of that officer being taken from the English ecclesiastical law. The powers of probate courts differ greatly in the several states; in all the rule exists that a will cannot pass real or personal estate until it has been proved in due form by the court of probate. The English law that a probate of a will is not admissible as evidence in common-law courts has been modified or abrogated in many states. From the probate an appeal lies to a higher court; and if this be neglected, it is not competent for a party to go into a court of common law with questions as to the sanity or capacity of the testator, or of the proper execution of the testament. Many probate courts, however, are without any authority as to the construction or effect of a will, their jurisdiction extending to the probate proper only. There are two methods of probate, that "in common form" where the proceedings are *ex parte* and without notice to the next of kin or legatees; and proof in "solemn form," where notice is given to all parties interested, and they are given an opportunity to be heard. In the former case any party interested in the premises has the right to call upon the executor to make proof in "solemn form" any time within 30 years after the first probate. The probate in solemn form is the usual method in this country, and in some states is required by statute. When once approved after a hearing of this kind the will is binding. The party presenting the will is called the proponent, and a disputing party the contestant. The question before the court is whether the document presented is or is not a will. In the United States citation or notice is generally issued by the court to all interested. The most important testimony is that of the attesting witnesses. If, on account of death, absence, or incompetency, a witness cannot be produced, the will may be proved by the other witnesses and testimony of the handwriting of the absent. If all are dead or absent, the handwriting of all must be proved. The capacity of the testator cannot be impeached by an attesting witness without suspicion. The presumption is that if the attestation clause be properly drawn, the requirements as to the subscribing witnesses have been fulfilled, though, as is often the case, they may have forgotten what was said or done on the occasion. A will is said to prove itself 30 years after the death of the testator; nothing is then necessary but its production and presentment to the court. It must, however, be clear from all suspicion of forgery, and come from a trustworthy source. The contents of a will which has been lost, stolen, or destroyed may be proved in the probate court, but the evidence must be very clear and strong.

PROBOSCID'EA, a section of *pachydermata*, of which the characters are given under that head, contains one recent and one fossil genus, *elephas* (see ELEPHANT) and *mastodon* (q.v.); so that the proboscidea seem not to have been numerous at any period of the world's history. Notwithstanding the great size of these creatures, comparative anatomists have pointed out various resemblances in their dentition, osteology, etc., to rodents.

PROBOSCIS MONKEY. See NASALUS.

PRO'BUS, MARCUS AURELIUS, Emperor of Rome, was b. at Sirmium, in Pannonia. His father, Maximus, served first as a centurion, and afterward as a tribune in the Roman army, and died in Egypt, leaving to his only son a good name and a moderate income. Probus early entered the army, and had the good fortune to attract the favorable notice of the emperor Valerian, who elevated him before the legal period to the rank of tribune. His subsequent conduct justified his rapid promotion, for he greatly distinguished himself against the Sarmatians on the Danube, and subsequently in Africa, Egypt, Asia, Germany, and Gaul, winning golden opinions from Valerian's successors, Gallienus, Claudius II., Aurelian, and Tacitus. By the last-named emperor, he was appointed governor of the whole Asiatic possessions of Rome, and declared to be the chief mainstay of the Roman power; and such was the zealous attachment evinced for him by his soldiers, whose respect and love he had equally won by his firm discipline, by his care in providing for their wants and comforts, and his liberality in the distribution of plunder, that, on the death of Tacitus, they forced him to assume the purple; and his rival, Florianus, having been removed, Probus was enthusiastically hailed emperor by all classes (276 A.D.). His brief reign was signalized by brilliant and important successes; the Germans, who, since Aurelian's time, had made Gaul almost a part of Germany, were driven out with enormous slaughter, pursued into the heart of their own country, compelled to restore their plunder, and to furnish a contingent to the Roman armies. Pursuing his victorious career, Probus swept the inimical barbarians from the Rhætian, Pannonian, and Thracian frontiers, and forced Persia to agree to a humiliating peace. Various aspirants to the imperial purple were also put down. On his return to Rome Probus celebrated these fortunate achievements by a triumph, and then, the external security of the empire being established, devoted himself to the development of its internal resources. The senate was confirmed in its privileges; liberal encouragement was given to agriculture; numerous colonies of barbarians were established in thinly-peopled spots, that they might adopt a civilized mode of life; and all branches of industry were protected and promoted. But Probus was at a loss what to do with his army, as the Romans had now no enemies either at home or abroad; and fearing that their discipline would be deteriorated by a life of inactivity, he employed the soldiers as laborers in executing various extensive and important works of public utility. Such occupations, considered as degrading by the soldiers, excited among them the utmost irritation and discontent; and a large body of troops, who were engaged in draining the swamps about Sirmium, giving way to these feelings, under the excitement produced by the presence of the emperor, murdered him, 282 A.D. Probus possessed great military genius, combined with equal administrative talent, and added to these a wisdom, justice, and amiability equal to that of Trajan or the Antonines.

PROCEDURE, in law, a term used by legal writers to indicate the formal proceedings in a suit and the rules governing them. The English courts of law, from the first, enforced rights by various actions. "Real actions" were used for the recovery of lands; but in later times were mostly abandoned, and "ejectment" became the usual method of trying title to land. The other legal actions were "covenant," to recover damages for breach of an agreement under seal; "assumpsit," to recover damages for breach of a contract not under seal, whether written or parole; "trover," to recover damages for the conversion of chattels; "detinue" and "replevin," to recover possession of chattels; "debt," to recover a liquidated sum from the defendant; "trespass," to recover damages for a wrongful act of violence to property or person; and "case," to recover damages where such act was without violence, or the injury complained of was indirect. The rules of these actions were exceedingly technical, as were the rules of pleading used in conducting them; and though the rights of a party might be perfectly clear, he would lose the suit if he had failed to bring the technical form of action suitable to their enforcement, or violated the particular form of plea. At equity, there were no specified forms of action; but one simple form of procedure enabled parties to establish their claims or defenses, and, if necessary, afforded the relief asked for. The complainant's case was set forth in detail in the "bill," to which defendant replied, stating his side of the case, in the "answer," and the court so framed its decree as to afford relief to the proper parties, whether complainants or defendants, and equitably to arrange the rights of all parties interested. To secure this equitable adjustment, every person whose interests would be affected by the chancellor's decree was made party to the suit. The principles of procedure at common law and at equity were adopted in this country, where they were for a long time substantially identical with the English forms of procedure from which they were taken. The old common-law pleading, and the distinction between courts of equity and law are still retained in some states. But since 1848, when the legislature of New York authorized a civil code, chiefly the work of David Dudley Field, many other states have given up the old methods, abolished the distinction between law and equity, and substituted a single "civil action" for the enforcement of all rights. All proper defenses, whether legal or equitable, are available and may be combined in this action, and similarly, all claims of whatever nature may be enforced. The final judgment of the court, like a decree in chancery, from the consideration of all the claims and defenses, determines the rights of all the parties to the suit. The technical forms of pleading have also been abolished in New York and other states which have adopted a code modeled after that of New York. The parties to the suit, in setting up their claims or defenses, are only required to make a statement of their claims or defenses in ordinary words. This system, with inconsiderable modification of detail, now prevails in 23 states and territories. It is a "civil" code only, and in criminal cases the old exactness of pleading is still required.

PROCELLAR'IDÆ, a division of Cuvier's section of *longipennes* (q.v.), comprising the petrels, members of which are Mother Carey's chickens. See PETREL, and MOTHER CAREY'S CHICKENS, *ante.*

PROCESS is the system of action by which a court calls parties into court for purposes of litigation. There are numerous rules governing the steps of process, but these are all of a technical nature.

PROC'ESS (*ante*), in law, the means of enforcing the appearance in court of a defendant and his obedience to the writ of the court. In civil cases, it was the practice to issue a summons to the defendant, which, in real actions, was served by the erection of a white wand on the inclosure of the defendant, and in personal actions was served by two summoners. If the defendant paid no attention to this summons, his goods were attached. In trespasses the attachment was issued immediately without a summons. On failure of the attachment, a *distringas* issued and was not discontinued till the appearance of the defendant. In case of injuries committed with force to the person, arrest was authorized. In England till the reign of William IV., an action was begun by original writ in the king's name, addressed to the sheriff, ordering him to summon the defendant. Since then personal actions are begun, if the defendant is to be arrested, by a writ of *capias*, which is an order of the court commanding the sheriff to take the defendant and hold him to bail, or, in default of bail, to keep him in custody. If the defendant be not to be arrested, a summons issues ordering him to appear and answer the plaintiff's claim. The similar process in the admiralty and ecclesiastical courts is called a citation, and, in chancery, a subpœna. The methods of procedure in the states of the union which retain the common-law procedure are different, but generally conform to the writ of summons. In those states where a new code of procedure has been adopted, suits in the superior court begin by a summons or notice to the defendant ordering him to appear in court within a certain time. This notice or summons is issued by the clerk of the court, or by the plaintiff or his attorney, in some states. In New England, it is the practice to begin a suit by attachment of the defendant's property. Final process, or process of execution is enforced either against the person or the property of the defendant. The former can be resorted to only where the defendant may be arrested. The latter, called the execution, or *fieri-facias*, commands the sheriff to satisfy the execution out of the defendant's property. The other writ of execution, called the *capias satisfaciendum*, commands the sheriff to seize the defendant's body in default of property.

PROCES'SIONAL (Lat. *processionale*), the service-book which contains the prayers, hymns, and general ceremonial of the different processions. Many ancient books of this class have been preserved. The processional approved for common use is that of Rome, of which many editions have been published.

PROCESSION OF THE HOLY GHOST, that doctrine regarding the third person of the blessed Trinity which teaches that as the Son proceeds (or is born) from the Father, so the Holy Ghost proceeds (or emanates) from the Father and from the Son, but as from one principle. The question of the origin of the Holy Ghost was not distinctly raised in the early controversies, which fell chiefly upon the second person. In the creed of Nice, no allusion whatever is made to the subject; and in the creed of Constantinople, the Holy Ghost is said simply to "proceed from the Father." Nevertheless this was understood in the Latin church to mean that, as the Son proceeds from the Father, the Holy Ghost proceeds from both Father and Son; and in the course of the 7th and 8th centuries, the words "and from the Son," for greater distinctness came to be added to the creed in the several churches—as the west. In the controversy with the Latins, Photius (q.v.) took exception to this addition, as unauthorized, and made the addition one of the grounds for his charge of heresy against them, which was resumed on the consummation of the schism under Michael Cerularius. In the union of the Greek and Latin churches at Florence (1437), an article of agreement on this head was adopted, and the words *Filioque* were sung twice over both in Latin and Greek, in the solemn mass which celebrated the union. But this union had no root in the popular mind, and the dispute still continues as of old to divide the churches.

PROCESSIONS, as solemn and religious rites, are of very great antiquity. With the Greeks and Romans, they took place chiefly on the festivals of Diana, Bacchus, Ceres, and other deities; also before the beginning of the games in the circus; and in spring when the fields were sprinkled with holy water to increase their fertility. The priests used to head them, carrying images of the gods and goddesses to be propitiated, and either started from certain temples or from the capitol. Among the Jews, certain processions around the altar were (and still are to a certain extent) usual on the feast of tabernacles; and from them the Mohammedans have adopted their mode of encompassing the sanctuary seven times at Mecca (q.v.). Processions form a prominent part of the Buddhist worship. The practice was early adopted in the Christian church. The reformation abolished it; and even in the Roman Catholic church, especially in mixed countries, processions are less frequent or popular now than in former years. They are there either supplicatory processions, and are either directed to a certain distant place, to some miraculous image or object, or they are confined to the streets of the cities and the churches. Banners, crosses, and images are generally carried in front; the clergy follow; and the people make up the rear, singing hymns or reciting prayers. In some Protestant states, they are still permitted under certain restrictions. There is no doubt that, whatever their general intrinsic value, they offer in many instances one of the most strikingly picturesque features of the Roman faith, and that they answer a certain instinctive want in the multitude. For extensive pilgrimages, as such, their history and rites, we refer to PILGRIM, MECCA, FESTIVALS, etc.

PROCHEIN AMI, the old Norman-French for next friend, still often used in English law, means the next person in whose name an infant sues in a court of law, or a married woman in a court of equity. The chief object is to have a person responsible for costs. See NEXT FRIEND.

PRO'CIDA, an islet of Italy, between the island of Ischia and the shores of Naples, and separated from both of these by sea-ways about a m. in width, is 3 m. long and 1 m. broad. Pop. 13,810. On its shores is the city of the same name, with a commodious harbor, a fine regal palace, and a horrible state-prison, recently rendered famous by Carlo Poerio, who was confined there in chains.

PROCLAMATION, a public notice given by the sovereign to his subjects. The power of issuing proclamations is part of the prerogative of royalty as the fountain of justice. They sometimes consist of an authoritative announcement of some matter of state, or act of the executive government affecting the duties and obligations of subjects. The demise of the crown, and accession of a new sovereign, a declaration of war, and the issue of new coin, are all occasions on which a royal proclamation is issued. A proclamation may also be issued to declare the intention of the crown to exercise some prerogative or enforce some law which has for a long time been dormant or suspended. In time of war, the crown by a proclamation may lay an embargo on shipping, and order the ports to be shut. But the most usual class of proclamations are admonitory notices for the prevention of offenses, consisting of formal declarations of existing laws and penalties, and of the intention to enforce them; such as the proclamation against vice and immorality, appointed to be read at the opening of all courts of quarter sessions in England.

Proclamations are only binding when they do not contradict existing laws, or tend to establish new ones, but only enforce the execution of those which are already in being, in such manner as the sovereign judges necessary. A proclamation must be under the great seal. Statute 31 Henry VIII. c. 8 declared that the king's proclamations should be as binding as acts of parliament; an enactment which, while it subsisted, made an entire revolution in the government; but was repealed by 1 Edw. VI. c. 12. In later times, it was attempted to be maintained by the crown lawyers that the king might suspend or dispense with an existing law by proclamation; a power, however, which act 1 Will. and Mary c. 2 declared not to exist.

PRO'CLUS, called the SUCCESSOR (*Diadochos*)—i.e., of Syrianus, as the head of the Athenian school—a celebrated Neoplatonist, was b. in Constantinople in 412. He was of Lycian origin, and received his first instruction at Xanthus, in Lycia. He then studied at Alexandria under Arion Leonaras, Hero, and especially under Heliodorus, with whom he applied himself chiefly to Aristotelian and Platonic philosophy. From thence he went to Athens, where a certain Plutarch, a philosopher, and his daughter. Asclepigieneia, became the instructors—the latter a priestess of Eleusis, chiefly in theurgic mysteries. The vivid imagination and enthusiastic temperment which in his childhood already had led him to believe in apparitions of Minerva and Apollo, naturally convinced him when all the influences of the mysteries (q.v.) were brought to bear upon him, still more of his immediate and direct intercommunication with the gods; and distinctly believed himself to be one of the few chosen links of the Hermaic chain through which divine revelation reaches mankind. His soul had, he thought, once lived in Nicomachus the Pythagorean, and, like him, he had the power to command the elements to a certain extent, to produce rain, to temper the sun's heat, etc. The Orphic poems (q.v.), the writings of Hermes, and all that strangely mystical literature with which the age abounded, were to him the only source of true philosophy, and he considered them all more or less in the light of divine revelations. That same cosmopolitan spirit in religious matters which pervaded Rome toward her end, had spread throughout all the civilized "pagan" world of these days, and Proclus distinctly laid it down as an axiom, that a true philosopher must also be a hierophant of the whole world. Acquainted with all the creeds and rites of the ancient Pantheons of the different nations, he not only philosophized upon them in an allegorizing and symbolizing spirit, as many of his contemporaries did, but practiced all the ceremonies, however hard and painful. More especially was the practice of fasting in honor of Egyptian deities, while, on the one hand, it fitted him more and more for his hallucinations and dreams of divine intercourse, on the other hand more than once endangered his life. Of an impulsive piety, and eager to win disciples from Christianity itself, he made himself obnoxious to the Christian authorities at Athens, who, in accordance with the spirit of religious intolerance and fanaticism which then began to animate the new and successful religion against which Proclus waged constant war, banished him from this city. Allowed to return, he acted with somewhat more prudence and circumspection, and only allowed his most approved disciples to take part in the nightly assemblies in which he propounded his doctrines. He died in 485, in his full vigor, and in the entire possession of all his mental powers, for which he was no less remarkable than for his personal beauty and strength.

Respecting his system, some modern philosophers have exalted it to an extent which his own works would hardly seem to warrant. Victor Cousin holds that he has concentrated in it all the philosophical rays which emanated from the heads of the greatest thinkers of Greece, such as Pythagoras, Plato, Aristotle, etc. Proclus recognizes a certain kind of unity of the Creator, or rather of the divine mind, of which he took the human to be a fragment; and he speaks of the "One" and the "First." The human soul he considered wrapped up in various more or less dense veils, according to the degree of perfection attained; and he further assumed a certain sort of solidarity between the souls of those who naturally, or by certain immutable circumstances, were linked together, such as children and parents, rulers and subjects; and he carried this doctrine so far as to assert, that the children must naturally participate in their parents' faults. Faith alone, he further held, was essential to the attainment of theurgy, which, comprising mantic and supernatural inspiration, is preferable to all human wisdom; and in this he chiefly differs from Plotinus (q.v.), with whose system he agrees in most other respects. He further tries to recognize and to fathom the original mysterious one by combination of figures, strongly reminding us of Gnosticism and the latter Kabbala. His way of developing the finite beings out of the infinite unit is also peculiar. A whole series of triads, at the head of each of which again stands a unit, goes in various gradations through the creation, the lower powers emanating from the higher, which are the thinking and creative ideas, etc. See PLOTINUS, GNOSTICS.

Of his manifold works, there have survived several hymns which by the true poetical and religious spirit which pervades them, stand out most favorably among the generally inane Orphic hymns. Of his astronomical and mathematical writings, there have survived a short summary of the chief theories of Hipparchus, Aristarchus, Claudius Ptolemæus, and others, a work *On the Heavenly Spheres*, a commentary on Euclid, and a work—only known in a Latin translation—*On the Effects of the Eclipses of the Sun and Moon.* His grammatical works consist of some commentaries on Homer, Hesiod, etc. The greater part of his writings is devoted to philosophy. These are partly commentaries and paraphrases of Platonic dialogues, and partly the embodiments of his own ideas in a systematic form. We thus have a work—again preserved in Latin only—*On Providence and Fate*, *On the Ten Doubts about Providence etc.*, *On Platonic Theology*, and other minor works, extant in a more or less fragmentary form, and repeatedly edited, with translations and modern commentaries. The most important of his works, however, is the *Philosophical and Theological Institution*, in which Proclus geometrically, as it were, evolves his doctrines by heading each of its 211 chapters by a kind of proposition, which he proceeds to demonstrate, appending corollaries in some instances. He chiefly treats in it of unity and multiplicity, on productive causes and effects, on the highest good, on that which suffices in itself, on immobility, perfection, eternity, divinity, and intelligence; on the soul, etc. Next in importance stand his commentaries on Plato's *Timæus*, which, however, now only embraces a third of this dialogue, a similar commentary on Plato's *Parmenides*, in seven books, on *Cratylus*, the *First Alcibiades*, and fragments on other Platonic writings. Some other works attributed to Proclus have by modern investigators been pronounced to be spurious.

PROCON'SUL, a Roman magistrate not holding the consulship, who was invested with powers nearly approaching those of a consul, not, however, extending over the city and its vicinity. The proconsul was, at first, one who had held the office of consul, whose *imperium* was prolonged to enable him to bring an unfinished campaign to a close. The duration of the office was a year. During the latter period of the republic, when the consuls were expected to spend the year of their consulate at Rome, they were generally appointed at its close to undertake, as proconsuls either the conduct of a war in some province, or its peaceful administration. Occasionally, the office of proconsul, with the government of a province, was conferred on a person who had never held the consulship. Under Constantine, parts of certain dioceses came to be governed by proconsuls.

PROCOP, ANDREW, the Hussite leader, known as Procop the elder, or the holy, or the shaven, in allusion to his having received the tonsure in early life, was born toward the close of the 14th c., and belonged to a noble family of Prague. After having traveled with an uncle for some years through France and Spain, he returned to Bohemia at the outbreak of the religious wars, in which Ziska (q.v.). took so prominent a part, and at once entered the ranks of the insurgent Hussites. His military genius soon raised him to the rank of an influential commander; and on the death of Ziska in 1424, Procop was elected by the Taborites, who formed an important section of the Hussites, as their leader, and from this period till 1427 his history presents an almost unbroken series of daring attacks upon the Austrians. In the meantime, another body of Taborites, who called themselves orphans, had overrun Lausitz, and burned Lauban, under the leadership of a man, subsequently known as Procop the lesser, or younger, who now, in concert with the more distinguished Procop, attacked Silesia, and took part in those internal feuds of the Hussite factions by which Bohemia was almost wholly ruined. The threatened approach of three German armies, which had been levied by the neighboring states to carry on an exterminating crusade against the heretics, was alone able to restore unanimity to the divided Hussites, who, under the leadership of the two Procops, offered a desperate and successful resistance to the larger numbers of the Germans, subsequently pursuing their enemies with fire and sword through Silesia, Moravia, and Hungary, as far as Presburg. In 1429 Procop made inroads into the German states as far as Magdeburg, and returned to Bohemia laden with spoil, and followed by a numerous band of captive nobles and knights; and in the following year, at the head of 50,000 men-at-arms, and half as many horsemen, he again broke into Misnia, Franconia, and Bavaria, and after having burned 100 castles and towns, and destroyed 1400 villages and hamlets, and carried off a vast amount of treasure, turned his arms against Moravia and Silesia. The emperor Sigismund at this crisis offered to treat with him, but the imperial demand that the Hussites should submit to the decision of a council, afforded Procop a pretext for breaking off all negotiations with the imperial court. A second German crusading army now advanced in 1431, but was thoroughly defeated at Riesenburg. These successes, which were followed by others of nearly equal importance in Silesia, Hungary, and Saxony, where the princes had to purchase peace at the hands of the two Procops, on humiliating terms, induced the council of Basel to propose a meeting between the Hussite leaders and ten learned Catholic doctors. The meeting lasted 50 days, but was productive of no good result, and Procop returned to Bohemia, where, combining his forces with those of Procop the lesser, he laid siege to Pilsen. The council, on this, passed an act, known as the Basel compact, by which the Hussites were allowed the use of the cup in the Lord's-supper, and the Bohemians were designated by the title of the "first sons of the Catholic church." The Taborites and orphans, under the leadership of the two Procops, refused, however, to have anything to do with the pope, and hence dissensions arose between them and the more moderate of the Hussites. After many lesser encounters between these factions, a decisive battle was fought near Lipau in 1434, in which Procop was induced, by a feint of the enemy, to leave his intrenchments. His followers at first fought desperately against the troops of the Bohemian nobles, who were commanded by Meinhard of Neuhaus; but at length, under the influence of a sudden panic, they gave way, and took to flight. Procop, after vainly striving to re-form their broken lines, threw himself into the midst of the enemy, and was killed. Procop the lesser, following in his steps, was also slain, and with these two brave Hussite leaders the cause of the Taborites perished.

PROCO'PIUS, an eminent Byzantine historian, was born at Cæsarea, in Palestine, about the beginning of the 6th c., went to Constantinople when still a young man, and acquired there so high a reputation as a prof. of rhetoric, that Belisarius, in 527, appointed him his private secretary. Procopius accompanied the great warrior in all his important campaigns in Asia, Africa, and Italy, and appears to have displayed remarkable practical as well as literary talent, for we find him placed at the head both of the commissariat department and of the Byzantine navy. He returned to Constantinople shortly before 542, was highly honored by Justinian, and appointed prefect of the metropolis in 562. His death occurred, it is thought, about three years later. Procopius's principal works are his *Historiæ*, in 8 books (two on the Persian war, from 408 to 553; two on the war with the Vandals, from 395 to 545; four on the Gothic war, going down to 553); *Ktismata*, or six books on the buildings executed or restored by Justinian; and *Anekdota*, or *Historia Arcana* (of doubtful genuineness), a sort of *chronique scandaleuse* of the court of Justinian, in which the emperor, his wife Theodora, Belisarius, *his* wife Antonina, and other distinguished persons, are depicted in the darkest colors. The most valuable of these productions is undoubtedly the first, in which Procopius writes with the clearness, weight, and fullness of knowledge that might be expected of a man who had been an eye-witness of much of what he narrates, and who had occupied a position that fitted him to thoroughly understand what he had seen. He is the principal authority for the reign of Justinian. His style is pure, vigorous, and flexible. The best edition of his complete works is that by Dindorf (3 vols. Bonn, 1833–38).

PRO'CRUSTÉS (Gr. "the stretcher,") the surname of a celebrated robber of Attica, named Damastes, or Polypemon. According to the ancient legend, he was wont to place all persons who fell into his hands upon a bed which was made either too long or too short for them, and where he racked their limbs till they died. This he continued to do until Theseus overpowered him, and made him suffer the tortures he had inflicted on others. The story has given rise to a figurative expression. When an author is subjected by a critic to a cruel or unfair mode of criticism, he is said to be stretched on "the bed of Procrustes."

PROCTER, BRYAN WALLER, an English poet, better known as BARRY CORNWALL, was born Nov. 21, 1787, and educated at Harrow. He studied law, was called to the bar in 1831, and for many years was one of the commissioners of lunacy, but resigned in 1860. His *Dramatic Scenes and other Poems* were published in 1819, and he subsequently produced several volumes, both of verse and prose, the most important being *Mirandola, a Tragedy*, produced with great success at Covent Garden. As a poet, Procter belongs to the school of Keats and Hunt, and through all his works the influence of the old English dramatists may be traced. It is not, however, on his *Dramatic Scenes* or his tragedies, but on his *English Songs and Lyrics*, that Procter's reputation rests. He may fairly be considered the best of our modern English song-writers. He died Oct. 4, 1874. *Bryan Waller Procter, an Autobiographical Fragment, with Biographical Notes*, appeared in 1877.

PROCTER, ADELAIDE ANNE, 1825–64; b. Eng.; the eldest daughter of Bryan Waller. In 1853 she became a contributor of verses to *Household Words* under the *nom de plume* of Mary Berwick, and attracted the attention of Charles Dickens, who did much in the way of introducing her contributions to the public. Afterward she contributed also to the *Cornhill Magazine* and *Good Words*, and in 1858 published her collected poems under the title of *Legends and Lyrics, a Book of Verse*. In 1860 another volume appeared entitled *A Second Volume of Verse;* and in 1865 both series were again published, with an introduction and short memoir by Mr. Dickens.

PROCTOR (formed by contraction from Lat. *procurator*, one who cares for another) is the name given to the practitioners in courts of admiralty, and in the ecclesiastical and prerogative courts. It corresponds to attorney or solicitor in the other courts. By a recent statute, which abolished the exclusive jurisdiction of the admiralty and prerogative courts, now the probate court, all proctors were put on the same footing as attorneys and solicitors, and the power to practice in the new courts indifferently was given to each; and at the same time compensation was given for the loss of their monopoly. The mode by which one becomes a proctor is therefore the same as that by which one becomes an attorney or solicitor (q.v.).

PROCTOR, HENRY, 1765–1822; b. Wales; entered the army in 1781, and became col. in 1810. In the war of 1812 he came to Canada at the head of the 41st regiment. He repulsed gen. Hull from Amherstburg, and defeated him at Brownston. For his victory over Winchester at the river Raisin he was made brig.gen. In 1813 Harrison defeated him at fort Meigs, and Croghan at fort Stephenson. Oct. 5 of the same year he was totally defeated by Harrison at the battle of Thames, and was afterward court-martialed and suspended from his rank and pay for six months. He was soon given his old rank, served again in the war of 1812, and rose to be lieut.gen.

PROCTOR, RICHARD ANTHONY, b. Eng., 1837; educated at King's college, London, and at Cambridge. He edited the *Proceedings* of the Royal astronomical society in 1872–73. He has constructed a chart of 324,000 stars, made researches into the transits of Venus in 1874, and propounded the theory of the inner complex solar atmosphere, discovered by prof. Young. He visited America, and lectured in 1873–74, 1875, and 1881. Among his works are *Saturn and his System*, 1865; *Half Hours with the Telescope*, 1868; *Other Worlds than Ours*, 1870; *Transits of Venus*, 1874; *A Treatise on the Cycloid*, etc., 1878; and *The Romance of Astronomy*, 1880.

PROCTORS, officers in the universities of Oxford and Cambridge (two in number in each), whose duties are to preserve the peace of the university, to repress disorders among the students, and inflict summary academical punishment. They have the command of the academical constabulary force, and have also an extensive police jurisdiction in the town. The proctors must be masters of arts, and are chosen by the colleges according to a certain rotation. They nominate two pro-proctors to be their deputies and assistants. The summary authority of the proctors extends both to under-graduates and bachelors of arts. They have also a legislative authority as assistants to the heads of houses, and vote in the election of some of the professors and other officers.

PRO'CURATOR-FIS'CAL, a legal practitioner in Scotland of some consequence, owing to his being the public prosecutor for a local district. He is generally a local procurator, or law-agent, and is appointed by the sheriff of the county, or in cities and towns by the magistrates. His business is to take the initiative in the prosecution of crimes. There being no coroner's inquisition in Scotland, he does the work which that functionary does in England. Whenever he has reason to believe a crime has been committed, his duty is to apply for a warrant to arrest the alleged criminal, or to summon him before the sheriff, when the witnesses are cited, and are precognosced—that is, they give what evidence they are in possession of. All the inquests and examinations of the procurator-fiscal are conducted privately; neither the press nor the public being allowed to be present. This arrangement, as tending to huddle up that which should be fully known—as, for example, the cause of catastrophes attended with loss of life—has latterly been the subject of earnest remonstrance. If the procurator-fiscal is informed of a crime which he thinks was either not committed, or of which there is no evidence satisfactory, he gives his concurrence merely to the private party who suggests it, but does not himself initiate the proceeding. When the procurator-fiscal takes the precognitions of the witnesses, he sends a copy of them to the crown counsel, of whom the lord-advocate is the chief; and if these counsel think the evidence is strong enough, and warrants more than suspicion, the prosecution is proceeded with to trial. The procurators-fiscal are now paid by salaries according to the population of the district.

PROCYON'IDÆ. See COATI; RACCOON; *ante.*

PROD'IGY. See OMEN.

PRODUCTION OF DOCUMENTS is often required in legal proceedings, or in the course of a suit, in Scotland, as well as in other countries; but it depends on the nature of the suit when and under what conditions the documents must be produced. As a general rule, whenever a right is founded on a document, that document must be produced or shown to the court which has to determine the nature of the right.

PRODUCTIVE and **UNPRODUCTIVE LABOR.** See LABOR.

PROFERT. See OYER

PROFES'SOR, an officer in a university whose duty it is to instruct students, or read lectures on particular branches of learning. In the early times of universities, the degrees conferred on students were licenses to act as public teachers; and the terms master, doctor, and professor were nearly identical in signification. As, however, the body of graduates ceased in the course of time to have any concern in public teaching, a separate class of recognized teachers sprang up, paid sometimes with salaries, in other instances by fees. These were called professors; and in the German and Scottish universities became the governing body, and sole recognized functionaries for the purpose of education. In the universities in which collegiate foundations prevailed, as Oxford and Cambridge, they became, on the other hand, only secondaries or auxiliaries, attendance on their lectures not being generally deemed indispensable, and the necessary business of instruction being carried on by the functionaries of the several colleges.

The word professor is occasionally used in a loose way to denote generally the teacher of any science or branch of learning, without any reference to a university. It has been assumed as a designation not only by instructors in music and dancing, but by conjurers.

PRO'FILE, the outline of a section through a cornice or other series of moldings.—The outline of a capital when drawn geometrically; the outline of the human face in a section through the median line, etc

PROGNO'SIS, (from the corresponding Greek word) is the term employed in medicine to indicate the opinion or decision of the physician regarding the probable course and issue of a disease. The physician is guided in arriving at his decision by his knowledge of the course which the disease usually follows; and as some diseases almost always end in recovery, and others almost invariably terminate fatally, the final result may often be predicted with great confidence. In forming a prognosis, the physician must, however, not only take into his consideration the natural history of the individual disease, but numerous modifying influences, such as age, sex, mode of life, previous state of health, etc.

PROG'RESS OF TITLES, in Scotch law, means the series or chain of conveyances by which a proprietor of lands establishes his right to property. As these titles are the sole evidences of property, the progress of titles—i.e., a short statement of the nature of each conveyance, in their historical order—is first given to a purchaser, to show that the vender is able to sell. See SALE OF LAND.

PROGRESSION, in arithmetic, is the succession, according to some fixed law, of one number after another. A series of numbers so succeeding one another is said to be "in progression." Progression may be of various kinds; but the three forms of most frequent occurrence are *arithmetical progression* (q.v.), *geometrical progression* (q.v.), and *harmonical progression*. The conditions of the harmonical progression of a series are frequently stated as follows: *three numbers are in harmonical progression, when the first has to the third the same ratio that the excess of the first over the second has to the excess of the second over the third*, i.e., a, b, c are in harmonical progression when $a:c::a—b:b—c$; but a much simpler conception of it is obtained by means of one of its properties, viz., that if the terms of a harmonical series be inverted, they form a series in arithmetical progression; thus, 1, 2, 3, 4, 5, 6, etc., is an arithmetical progression, and 1, ½, ⅓, ¼, ⅕, ⅙, etc., is a harmonical progression; 1, ½, 0, — ½, — 1, etc., is an arithmetical progression; and 1, 2, ∞ (infinity), —2, — 1, etc., is a harmonical progression. This series is principally important in connection with the theory of music, in determining the length of the strings of instruments. See MUSIC.

PROGRESSION, MUSICAL, the regular succession of chords or movement of the parts of a musical composition in harmony, where the key continues unchanged, is called progression; where a new key is introduced, it is not progression, but modulation (q.v.). Musical compositions move from note to note either by degrees, when the interval does not exceed, or by skips where it does exceed a whole tone. Motion in music of two parts is of three kinds: oblique, when one part repeats or holds on the same note, while the other moves up or down; direct, when both parts move in the same direction; and contrary, when one moves up, and the other down. In progressing from chord to chord, it is in general desirable to retain every note common to both chords in the same part in which it appeared in the first chord, and to assign every new note to that part in the second chord which is nearest to it. There are certain chords which require to be followed by certain others in order to resolve them (see RESOLUTION); and there are certain progressions which must in ordinary cases be avoided, more particularly consecutive fifths and consecutive octaves, the latter being, however, admissible when employed to strengthen a part.

PROHIBITION. Prohibitive duty refers to a practice, obsolete in this country, of prohibiting the importation of goods, with the view of encouraging native industry. See FREE TRADE.

PROHIBITION is a writ in England proceeding out of a superior court of law to prohibit or prevent an inferior court from proceeding to hear or dispose of a suit or matter over which it has no jurisdiction.—In Scotch law, the same word means a technical clause in a deed of entail by which the heir of entail is prohibited from selling the estate, or contracting debt, or altering the order of succession under pain of forfeiture, which forfeiture is declared by another supplemental clause called a resolutive clause.

PROJECTILES, THEORY OF, is the investigation of the path or *trajectory*, as it is called, of a body which is projected into space in a direction inclined to that of gravitation. A body thus projected is acted upon by two forces, *the force of projection*, which, if acting alone, would carry the body onward forever in the same direction and at the same rate; and *the force of gravity*, which tends to draw the body downward toward the earth. The force of projection acts only at the commencement of the body's motion; the force of gravity, on the contrary, continues to act effectively during the whole time of the body's motion, drawing it further and further from its original direction, and causing it to describe a curved path, which, if the body moved in a vacuum, would be accurately a parabola. This is readily seen by considering Fig. 1, in which A represents the point from which the body is projected (suppose the embrasure of a fort); AB the direction of projection (horizontal in this instance); A1 the distance which would be passed over by the projectile in unit of time if gravity did not act; 1—2, the distance which would similarly be described in second unit of time; 2—3, 3—4, etc., the distances corresponding to the third, fourth, etc., units of time—all these distances being necessarily equal, from the impulsive nature of the force of projection; A1′, again, represents the distance which the projectile would fall under the action of gravity alone in the first unit of time; 1′—2′ the distance due to gravity in the second unit of time; 2′—3′ the distance due to the third unit, etc., the distances A1′, A2′, A3′, etc., being in the proportion of 1, 4, 9, etc. (see FALLING BODIES); hence, by the well-known principle of the *composition of forces and velocities* (q.v.), we find at once, by completing the series of parallelograms, that at the end of the first unit of time the body is at *c*, at the end of the second at *b*, at the end

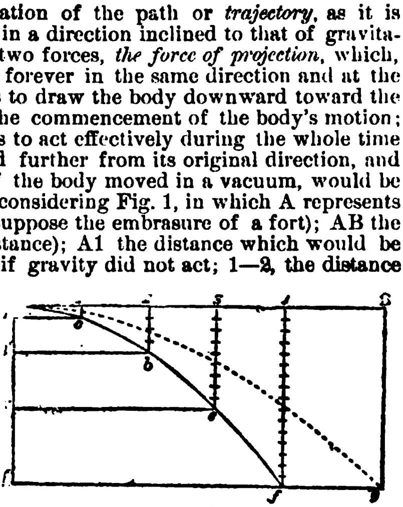

FIG. 1.

of the third at *e*, etc. Now, as the lines 1'*c*, 2'*b*, 3'*e*, etc., increase as the numbers 1, 2, 3, etc., and the lines A1', A2', A3', etc., as the numbers 1^2, 2^2, 3^2, it follows that the curve A*cbe* is a parabola (q.v.). As, by the second law of motion, each force produces its full effect undisturbed by the other, it follows that the projectile reaches *f* in the same time as it would, without being projected, have taken to fall to 4'. A greater velocity of projection would make it take a wider flight; but at the end of four seconds, it must still be at some point in the same horizontal line—at *g*, for example.

In order to determine exactly the motion of a projectile, and to find its range, greatest altitude, and time of flight, it will be necessary to examine its nature more technically—for which some slight knowledge of algebra and trigonometry is requisite. Let the body in this instance be projected obliquely to the direction of gravity, from the point A (Fig. 2) in the direction AT, and let the velocity of projection v be sufficient, if gravity were not to act, to carry it to T in t units of time, and let the force of gravity, if allowed to act upon it at rest, carry it to G in the same time; then, as before, the body, under the action of both forces, will be found at P (which is found by completing a parallelogram of which AT and AG are the sides) at the end of t units of time, having fallen through a distance equal to TP (not at once, but in a constant succession of minute deflections, as indicated in Fig. 1) in that time. Let t represent the time of flight, v the velocity due to projection, g the accelerating force of gravity, and let A be the angle of elevation TAB; then $AT = vt$, $TP = \frac{1}{2}gt^2$, $TM = vt \sin. A$; and consequently PM (or y) $= vt \sin. A - \frac{1}{2}gt^2$ (I.), and AM (or x) $= vt \cos. A$. Now, if we find from the last two equations the values of t, and equate these values, we obtain, by an easy algebraic process, the equation $y = x \tan. A - \frac{gx^2}{2v^2 \cos.^2 A}$; and if the height through which the body must fall to acquire a velocity equal to the velocity of projection be called h, then $v^2 = 2g.h$, $h = \frac{v^2}{2g}$, $4h = \frac{2v^2}{g}$, and $\frac{1}{4h} = \frac{g}{2v^2}$, substituting which in the equation, we obtain $y = x \tan. A - \frac{x^2}{4h.\cos.^2 A}$ (II.), as the equation to the path of a projectile, where x is the horizontal distance, and y the corresponding height above the level of the point of projection. Suppose, now, that we wish to find the *time of flight* on the horizontal plane, it is evident that at the end of its flight the projectile will be at B, and y will be equal to zero; hence, putting $y = o$ in equation I., we obtain $t = \frac{2v \sin. A}{g}$. The *range* or distance AB is similarly found by putting $y = o$ in equation II., when x is found to be equal to $4h \sin. A \cos. A$, or $2h \sin. 2A$. The ***greatest altitude*** is evidently the point which the projectile has attained at the end of half the time of flight, or after it has traversed half its horizontal range; hence, by putting $x = 2h \sin. A \cos. A$ in equation II., or $t = \frac{v \sin. A}{g}$ in equation I., we obtain $y = h \sin.^2 A$. A slight examination of the expression for the range will show that it is greatest when the body is projected upward at an angle of 45° to the horizon, and that a body projected at a greater angle than 45° has the same range as one projected at an angle correspondingly less (Fig. 3).

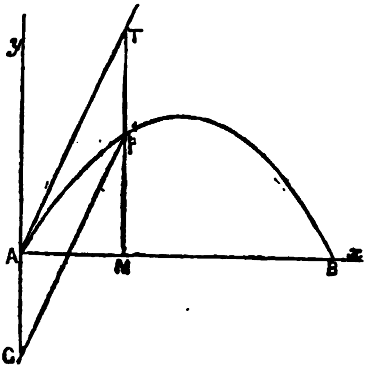

FIG. 2.

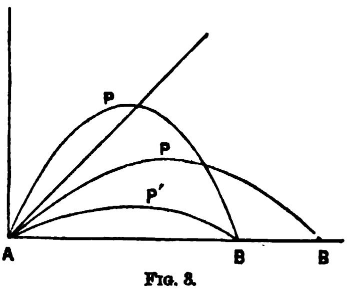

FIG. 3.

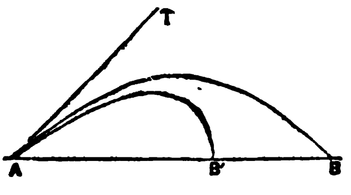

FIG. 4

These results, however, do not correspond to the actual circumstances of the case, except when the projectile possesses considerable density and its motion is slow, for in all other cases, the resistance of the air, which increases in a rapid ratio with the velocity of the projectile, causes it to deviate very considerably from a parabolic orbit, especially during the latter half of its course (Fig. 4). The problem of the motion of a projectile thus complicated becomes of considerable difficulty; partly because our knowledge of the law of resistance of the air is imperfect (it was supposed by Newton to be proportioned to the square of the velocity), and partly because the law varies with every minute change in the form, size, and density of the body projected, so that, under these circumstances, the beautiful and simple theory sketched above is practically useless. The chief illustrations of the theory of projectiles are the motion of missiles thrown by the hand, or arrows impelled from a bow, in both of which cases the resistance of the air is comparatively ineffective, the velocity being small; in the far more important case of ball-practice, whether with fire-arms or heavy ordnance, its effects are so powerful as to render the laws of gunnery mere deductions from experience. See RIFLE AND RIFLED ORDNANCE, and GUNNERY.

PROJECTION is the representation on any surface of objects or figures as they appear to the eye of an observer. It thus includes perspective (q.v.), and is most simply illustrated by the shadow of an object thrown by a candle on a wall; the shadow being the projection, and the place of the light the position of the eye. The theory of projections is of great importance, both in mathematics and geography, being, in the former case, perfectly general in its application; while in the latter only the projection of the sphere is required. Projections of the sphere are of various kinds, depending upon the position and distance of the eye from the sphere, and the form of the surface on which the projection is thrown; thus we have the *orthographic*, *stereographic*, *globular*, *conical*, and *cylindrical or Mercator's* projections, all of which are treated of under the article MAP. Another projection frequently employed is the *gnomonic*. In the gnomonic projection, the eye is supposed to be situated at the center of the sphere, and the surface on which the projection is thrown is a plane surface which touches the sphere at any one point (called the *principal point*). It is evident that a map constructed on the gnomonic projection is sensibly correct only for a circular area whose circumference is at a small angular distance from the principal point. From the position of the eye in the gnomonic projection, it follows that all great circles, or portions of great circles, of the sphere are represented by straight lines, for their planes pass through the eye. The distance of two points on the sphere, when measured along the surface, is least if they are measured along a great circle; and as the distance of the projections of these points on the plane is represented by a straight line, which is the shortest distance between two points on a plane, this projection, if employed in the construction of mariners' charts, would at once show the shortest course. Maps of the earth's surface have been projected by the gnomonic method, the surface of projection being the interior surface of a cube circumscribing the sphere, and the complete series consequently amounting to six maps; but it is not fitted for the construction of maps of large portions of the earth's surface. The gnomonic projection derives its name from its connection with the mode of describing a gnomon or dial (q.v.). The orthographic and stereographic projections were employed by the Greek astronomers for the construction of maps of the heavens; the former, or *analemma*, being the best-known and most used. The stereographic, called *planisphere* by the Greeks, is said to have been invented by Hipparchus, and the gnomonic is described by Ptolemy. The others are of modern invention.

In mathematics, the theory of projections is general in its application, and has been employed within the last few years to generalize the ancient geometry, and as a powerful aid to algebra. Its basis is the investigation and determination of those properties which, being true of a figure, are also true of its projections, such properties being necessarily dependent, not on the "magnitude," but on the "position" of the lines and angles belonging to the figure. These properties are generally denominated *projective properties*. For instance, the three conic sections, the parabola, ellipse, and hyperbola, are merely various projections of a circle on a plane, and all "positional" properties of the circle are at once, by this theory, connected with similar properties of the three conic sections. The theory is also largely employed in demonstrative mechanics.—See, for further information, Mulcahy's *Modern Geometry*, Salmon's *Conic Sections*, Monge's *Géométrie Descriptive*, Poncelet's *Propriétés des Figures Projectives*, and Poisson's *Traite de Mécanique*.

PROLAPSUS ANI is a common affection of the termination of the intestinal canal, and consists in an eversion of the lower portion of the rectum, and its protrusion through the anus. It may depend on a naturally relaxed condition of the parts, as in infancy, or may be caused by violent straining in cases of costiveness, piles, etc. Whenever it occurs, the parts should be washed, and, if possible, replaced by careful pressure with the hand; and if they do not easily return, the forefinger should be oiled, and pushed up into the anus, and it will convey the protruded intestine with it, after which the patient should retain the recumbent position for some hours. If it cannot be returned by the above means, surgical assistance should be at once sought. In order to remove the tendency to prolapsus, the patient should regulate his bowels so as to avoid costiveness, should sponge the parts after every evacuation with cold water or soap and water; and, if necessary, use astringent injections, as, for example, a weak solution of sulphate of iron, one grain to the ounce. Dr. Druitt (in his *Surgeon's Vade Mecum*) recommends a plan first suggested by Dr. M'Cormac—namely, that when the stools are passed, the skin near the anus should be drawn to one side with the hand, so as to tighten the orifice. If, after the adoption of these means, the bowel continues to descend, certain surgical means must be resorted to, as destroying a small portion of the relaxed mucous membrane by the application of nitric acid, or pinching up a few folds of the protruded membrane with the forceps, and applying ligatures to them.

PROLAPSUS UTERI—known also as PROCIDENTIA or DESCENSUS UTERI, by writers on the diseases of women; and as "falling down of the womb," or "bearing down," among non-professional persons—consists essentially in a depression of the womb below the natural level in the pelvis. It is a common affection amongst all ranks, and is most frequent in women beyond the middle age who have borne large families. It has, however, been met with in women who have not borne children, in virgins, and even (although very rarely) in children. It may occur in every degree, from the case in which the mouth of the womb is a little lower than its natural level, to that in which the womb itself projects externally, and forms a protruding tumor as large as a melon. In the latter case, it displaces by its traction the bladder, rectum, and other important structures. The prolapse is termed *imperfect* as long as there is no external protrusion, and *perfect* when the womb is protruded externally. The causes of these different degrees of prolapse are the same, and the symptoms differ only in intensity. The immediate causes are, according to sir C. Clarke: (1) Relaxation of the ligaments of the uterus; (2), a want of due tone in the canal leading from the uterus to the external surface. The latter is probably the chief cause. After many child-bearings, it remains dilated, and its walls lose their resisting power. Similar effects result from repeated uterine hemorrhage, leucorrhœa (popularly known as the *whites*), and general debility. Under these conditions a very slight downward force will depress the womb; and this force is supplied by the increased weight of the organ itself, if the patient sit up or walk soon after delivery, by violent vomiting or straining (when the bowels are constipated), by the endeavor to lift heavy weights, etc.

The symptoms arise partly from the pressure of the womb on other organs, partly from the simultaneous displacement of adjacent parts (as the bladder, rectum, etc.), and partly from reflex action (see NERVOUS SYSTEM). Patients with only a slight displacement usually complain of a sensation of fullness in the pelvis, of weight and bearing down, of dragging from the loins, often amounting to pain in the back, these symptoms being aggravated when the upright position is assumed. Strangury (q.v.) is occasionally present, and if the womb descend low or protrude, there is always more or less difficulty in evacuating the contents of the bladder and rectum. The digestive organs soon become affected through reflected nervous influence. It is a remarkable fact that the general health is often much worse in those cases in which there is a slight depression than in those in which the prolapse is complete, and the womb forms an external tumor.

The treatment varies with the degree of displacement. In the milder cases, medicine should be administered with the view of giving tone to the mucous membrane of the relaxed canal; while in the severe cases, mechanical support is requisite. In comparatively mild cases, prolonged rest in the horizontal position should be enforced, and cold water (from half a pint to a pint) should be slowly injected, night and morning, into the canal leading to the uterus, by means of an elastic bottle, the patient being in the recumbent position as she receives the injection. If this treatment is insufficient, astringent injections, as decoction of oak-bark or of galls, or a solution of alum (an ounce to the pint of water), should be tried. If, however, there is any congestion or inflammation of the parts, astringents must be avoided. In a case of complete prolapse, the first duty of the practitioner is to attempt to restore the womb to its natural position. It is sometimes necessary to place the patient in a warm bath, or to apply fomentations or leeches to the tumor before it can be replaced; and occasionally, irreducible cases occur, in which it may be necessary to remove the organ altogether. But suppose it returned to its position, a repetition of the prolapse has to be prevented. The ordinary method is by the introduction of a pessary—an instrument of an oval or globular form, and usually made of box-wood, which mechanically supports the uterus in its normal position. See the works of Churchill, West, and others *On the Diseases of Women*. In some cases a compress and bandage will afford sufficient support; while in other cases a surgical operation similar to that which is performed for *prolapsus ani* (q.v.) is expedient.

PROLÉTAIRES, a term used by the French (from whom it has been partially adopted by recent English and German writers) to denote the lowest and poorest classes of the community. It is derived from the Latin *proletarii*, the name given in the census of Servius Tullius to the lowest of the centuries, who were so called to indicate that they were valuable to the state only as rearers of offspring (*proles*).

PROME, a t. in the British territory of Pegu, on the left bank of the Irrawaddy, 113 m. n.w. of Pegu; pop. 30,000. It is surrounded by a brick wall, palisade, and ditch, about 2 m. in circuit, and outside of these are extensive suburbs. South of the town are many pagodas on small but steep hills. On account of the flatness of the ground on which it stands, the town is often inundated from the river. In 1856 nearly the whole of the town was destroyed by fire. It has many advantages for trade. Paper is made here, and in the adjacent country are extensive gardens and rice grounds. The town was taken by the British in 1825 and 1852. It is called by the Burmans *Pri* and by the Mohammedans *Pron.*

PROMETHEUS (Forethought), the son of the Titan Iapetus and of Clymene, brother of Atlas, Menœtius, and Epimetheus (Afterthought)—or, according to other legends, the son of Iapetus and Asia, or of Uranus and Clymene, or of Eurymedon and Here—the father of Deucalion, Hellen, Lycus, and Chymœrus. The myth of Prometheus is one of the oldest of Greek antiquity, being mentioned by Hesiod, and is briefly as follow: Once, under the reign of Zeus, men and gods were disputing with one another at Mecone; Prometheus, with a view to outwit Zeus, cut up a bull, and divided it into two parts, hiding the meat and the intestines in the skin, and putting a bad piece (the stomach) at the top of it; while he laid in another heap the bones, which were covered with fat. Zeus pointed out the unequal division, but was asked to choose, whereupon he guessed the deceit practiced, and selected the good portion; but, irate at the stratagem, he avenged himself on the mortals by withholding from them the fire necessary for the cooking of the meat; whereupon Prometheus stole it in a hollow staff and brought it to them. Zeus, to punish the mortals, caused Hephæstus to mold a virgin of rapturous beauty, Pandora, whom Epimetheus was unwise enough to receive as a present from Hermes; and thus brought, through her box, all imaginable ills that flesh is heir to upon humanity. Prometheus himself was chained to a rock, and an eagle sent to consume his liver in daytime, while Zeus caused it to grow again at night. Heracles, however, killed the eagle, and, by the permission of Zeus, delivered the suffering Prometheus. Thus far Hesiod's legend. Æschylus, in his tragedy with the name of the hero, has perpetuated another view of the myth. Prometheus, according to him, is an immortal god, a friend of the human race, who does not shrink even from sacrificing himself for their salvation. He is the long-suffering hero, who, although overcome by Zeus's superior might, yet does not bend his mind. He at first assists Zeus against his own kindred, the Titans, and even opens his head at the birth of Minerva. But when Zeus, having come to the throne, conceived evil plans against mankind, wishing to destroy them entirely, in order to create a new race, Prometheus throws himself into the breach; and while taking from them the evil gift of foreseeing the future, gives them the two infinitely superior gifts of hope and of fire. He is the inventor of architecture, astronomy, writing, figures, medicine, navigation, the mystery of prophecy, the arts of working in metal, and all other arts which embellish and adorn life. For these boons conferred on the human race, he is, by Zeus's order, chained to a rock in Scythia by Hephæstus, who fulfills this task reluctantly. Here he is visited by the Oceanides, by Io, who tells him of her own miserable wanderings, and by Hermes, who endeavors to find out that which Prometheus only knows, viz., who will be the son of Zeus and his successor. Refusing to divulge this secret, he is struck by Zeus's lightning, and hurled into Tartarus, whence he only reissues after a time to undergo new sufferings. He is now fastened to mount Caucasus, and the eagle, an offspring of earth and Tartarus, comes to torment him daily. Cheiron, the centaur, at last offers himself to supply Prometheus's place in hades—for on no other condition was he to be liberated than that some other immortal should offer himself in his stead. Cheiron, incurably wounded by Heracles, is accepted by Zeus.—Other legends give varying accounts. One makes Prometheus the creator of man out of earth and water—Zeus having, after the flood of Deucalion, ordered both him and Here to make man out of the mud left, and the winds to breathe life into them; and at Panopeus, in Phocis, a piece of that creative earth was in after-times shown to the wonder-struck multitude. It was also at his suggestion that Deucalion and Pyrrha built the vessel that bore them safely through the floods. Prometheus had a sanctuary at Athens, and torch-races took place in his honor. Many have been the explanations of this myth, one of which is, that it represents the human mind, which, in the consciousness of its own power, refuses to obey implicitly the will of Zeus; another, that it embodies the first struggles between the ancient (Pelasgian) powers of nature and the awaking of the mind, as represented by Zeus and the Olympians, etc. The subject is fully discussed in works on Prometheus by Welcker (1824), Weiske, Schömann, and Lasaulx (1845).

PROMISE, in English law, is often used to denote one side of a contract or agreement, either by word of mouth or in writing which is not under seal. In England, an action cannot be brought on a promise unless some consideration was given for it; but in Scotland a consideration is not necessary, provided the promise was made in earnest and with deliberation. A promise of marriage means a mutual promise, each being an equivalent for the other; and accordingly, if one breaks the promise, the other can sue for breach of it. See MARRIAGE.

PROMISE, in law (*ante*), the act of one party to a contract or agreement by which he engages to perform something of advantage to the other party, who is called the promisee. A naked promise is one without consideration, and therefore of no legal effect at common law, unless contained in a sealed instrument; and in most of the states the presumption raised by the seal may be overthrown by proof that there was no consideration. A promise may be *conditional*, in which case the condition must be complied with before the promise is binding, or it may be *implied*, where the law considers the party liable on account of acts or omissions on his part, though there has been no express undertaking by him. For what constitutes a valid promise of marriage see MARRIAGE, *ante*. Promises to do acts contrary to public morality or in aid of crime are, of course, void. When the fulfillment of the promise is prevented by the act of God or the promisee, the promisor is no longer bound. A confession obtained from a prisoner under arrest, by means of promises that he shall be released or favored in any way, is inadmissible in evidence, and very slight evidence of such a promise has been sometimes received.

PROMISSORY-NOTE is a contract by which A, the promiser, agrees to pay B, the promisee, a sum of money, either on request or on a future day. A is called the maker of the note, and B the payee of the note. The law affecting notes is substantially the same in all respects, and is always treated as part of that of bills of exchange (q.v.).

PROM'ISSORY NOTE (*ante*) must be in writing, without seal, and bearing the maker's signature, containing a promise to pay a certain sum of money absolutely at a certain time, and made payable to the bearer, or to a definite payee or order. As soon as a promissory note is indorsed, it is exactly like a bill of exchange. The maker corresponds to the acceptor, the indorsee to the payee, and the indorser to the drawer. The rules of law in regard to the liability of the parties, the time and place of payment, transfer and indorsement, defenses, notice, etc., are identical in the case of promissory notes and bills of exchange. See BILLS OF EXCHANGE.

PROMOTION, a term which has been applied to the granting of a degree by a university. The practice of conferring the title of doctor, by authority and after examination, seems to have originated in the university of Bologna, in the middle of the 12th century. Degrees were at first conferred by *coöptation*, i.e., admission by the common consent of the body of doctors; but in the beginning of the 13th c. Honorius III. placed promotions under the control of the archdeacon of Bologna.

PROMOTION, in the ARMY and NAVY. The efficiency of any body of men depends upon the energy of the individuals composing it; the root of that energy is emulation, and emulation can only be secured by maintaining a proper current of promotion. The efficiency of a service is thus dependent on the system of promotion adopted; and so important, consequently, does promotion become, that in the present article it is purposed to glance at the rules observed in the principal armies of the continent before describing the system which obtains in the British service.

In the *army of France* it is every common saying that every conscript has a marshal's *bâton* in his knapsack. Speaking of the times of the revolutionary war, this was doubtless true for battalions chose their chief officers from their own ranks—a conscript of one year was often a lieut.col. the next, and perhaps a brig.gen. the following. In the quieter times of recent years, however, progress is slower; and, although promotion is open to all, and a considerable proportion of the officers do rise from the ranks, yet it is very rarely indeed that an officer who has so risen ever attains a higher grade than that of captain. Junior commissions are—if the rule of the service were strictly followed—given, one-third to men from the ranks, one-third to cadets from the military schools, and one-third by government patronage. In practice it appears that in the artillery and engineers two-thirds of the first commissions are given to pupils from the Polytechnique. and the remainder to men from the ranks; while in the line two-thirds of the officers rise from the ranks, and one-third come from the military school of St. Cyr. Before officers can be promoted certain service in each rank is required, viz., as 2d lieutenant, two years; as lieutenant, two years; as captain, four years; as major, three years; and as lieutenant-colonel, two years. These periods are, however, curtailed in time of war. Promotion takes place in the regiment up to the rank of captain, two-thirds by seniority, and one-third by selection. From captain to major (*chef d'escadron ou de bataillon*), promotion is divided equally between seniority and selection; while to all higher ranks it falls exclusively to selection. The selection is made on reports by the inspectors-general of the several arms—their reports being founded on personal observation, and the testimony of senior regimental officers. To maintain rapidity of promotion there is a fixed age at which officers *must* retire—viz., lieutenant-general, 65; major-general, 62; colonel, 60; lieutenant-colonel, 58; major, 56; captain, 53; and lieutenant, 52. These ages do not prevent the officers of a regiment from being the opposite of youthful.

In *Austria* all officers are at first cadets; but a large proportion of these cadets are nominated from men in the ranks by their comrades. Promotion goes by seniority, and in the regiment, with occasional selection from other regiments.

The organization and officering of the German army are both peculiar. Every German subject, of whatever rank, is bound to serve from the age of 20 to 25; but in practice this service is reduced to a year in the case of professional men. Every officer must serve in the ranks, but not necessarily for more than a day. Young gentlemen intended for officers enter the ranks as *aspiranten*. They do duty as common soldiers for from six to nine months, and pass two examinations. Afterward they remain nine months at a division school, or twelve months at an artillery and engineer school. They then become eligible for appointment as officers when vacancies occur, which, however, they cannot obtain unless recommended by the officers of their respective regiments. Two-thirds of the first commissions are given to these aspiranten, and one-third to pupils from the cadet schools

In the *Italian* army, one-third of the sub-lieutenants are promoted from the ranks. Of subsequent promotion, two-thirds go by seniority, and one-third by selection.

It is always urged against the *British* system of army promotion, that it is too exclusive, and confines the commissions to the upper classes of society; and there is no doubt that promotion from the ranks is much rarer than in almost any other army. But, on the other hand, it is argued, the constituents of the force are very different. Soldiers in Britain are not conscripts, who necessarily comprise men of all classes and all degrees of education, but are taken, as a rule, from an extremely low and very uneducated class of society. Again, Britain has a true middle class, which is wanting in almost every continental nation. Its army is not, therefore, necessarily aristocratic because it is not officered from the ranks. Lastly, the habits of the different classes of society differ so greatly, that unless the soldier be very superior to his comrades, promotion to a commission is a small boon.

With regard to the actual system of promotion which obtains: in the ranks, promotion from private up to company-sergeant takes place in the company, and is made by the regimental officers. The promotion of company-sergeants to be staff-sergeants is made throughout the regiment. All these promotions are by selection entirely. Of the commissioned officers, the quarter-masters and riding-masters are appointed almost exclusively from the ranks; but they have no further promotion to look forward to—sergeants and sergeants-major are occasionally gazetted to ensigncies or lieutenancies. The junior combatant officers acquire their commissions either by a competitive examination open to the whole nation, or by previous service in the militia as officers, or in the ranks of the army as non-commissioned officers. The artillery and engineers are officered entirely by cadets from the royal military academy, whose subsequent promotion is by seniority only. In the cavalry, guards, and line, vacancies are, since the abolition of the purchase system in 1871 (see PURCHASE SYSTEM), filled by "seniority tempered by selection," the selection becoming more strict as the higher ranks are reached. The promotion of officers, up to the rank of captain, is mainly regimental, and is, at the same time, by seniority; but seniority is, in this case qualified by what has been called negative selection—that is, in other words, the exclusion of those officers who do not prove their fitness for promotion at the periodical inspections and examinations. Above the rank of captain, for *substantive* or *regimental* rank, seniority is little regarded, and selection is more absolute; but officers may hold at the same time *army* or *brevet* rank, conferred for distinguished service, or for mere seniority, in the general list of the whole army. This brevet rank does not affect the position in a regiment, and adds but a small sum to the officers' pay; but it is of great importance, inasmuch as colonels rise by seniority alone to be general officers, and colonel is almost exclusively a brevet rank (the only exceptions being in the artillery and engineers, where colonel is a regimental rank). Under these rules, it sometimes happens that an officer who has never held higher regimental rank than captain, may become successively, for good service, brevet-major, brevet-lieutenant-colonel, and brevet-colonel, until he succeeds, in his turn, to the rank of major-general. See also STAFF.

In the navy, the promotion of sailors to be petty officers is made by the captain of the ship; petty-officers are appointed to be warrant-officers by the admiral of the station, subject to admiralty confirmation. The commissioned officers are appointed and promoted by patronage solely. When a ship is first commissioned, the captain is allowed to nominate one cadet, the admiralty name the rest. Promotions are made by selection by the admiralty, except death vacancies which occur abroad; these are filled up by the admiral commanding on the station from the officers of his fleet. Above the rank of captain, all promotions take place by absolute seniority. There is no purchase of commissions in the navy.

PRONA'OS, the area or space before the cell of a temple, through which it was entered.

PRONG-HORN, or PRONG-HORNED ANTELOPE, *Antilope furcifera, dicranocerus furcifer*, or *antilocapra Americana*, a species of antelope inhabiting the great western prairies of North America. It is the *cabrit* or *cabree* of the Canadian voyageurs, is also called *goat* by the fur-traders, and sometimes receives the name of *spring-buck*. It is common between the Saskatchawan and the Missouri, and also on the Columbia, and is found in plains and on low hills, where there is no wood, or only scattered clumps of trees; never in mountainous districts, nor in forests. Its size is nearly that of the roe; in its general form and gait it resembles the chamois. In summer the hair of the prong-horn is smooth and flexible, but as winter approaches it lengthens; each hair becomes thick, its interior becomes white and spongy, and it loses its flexibility, at last becoming brittle, so that its point is easily rubbed off; but this singular fur forms a very close and warm covering for the animal. The prong-horn is generally seen in small herds, sometimes solitary. It is very curious about any strange object, and advantage is sometimes taken of this by Indian hunters, who crouch, run a few yards, and stop again; the prong-horns wheeling around them, coming nearer, and becoming still more curious, till they are within shot.

PRO'NOUNS, one of the classes of words or parts of speech, possessing a special interest both logical and philological. "*I* am sick." "*Thou* knowest the truth." "John was here, but *he* went away again." "Peter struck the boy, *who* had done *him* no harm." "*What* do *you* want?" The words in italics in these sentences are called *pronouns*, because they stand *for* (Lat. *pro*) nouns, or names of persons and things; and they are generally said to be used to prevent the too frequent repetition of the nouns. Yet the pronoun and the noun are not exact equivalents for each other. No noun can be an exact substitute for *I*, *thou*, or *who*. Pronouns are symbols, names, or highly generalized marks, applied to objects to signify, not any inherent attribute, but merely *their relations to the act of speaking*. They might therefore be called *relational names*. *I*, for instance, is a name applicable to all subjects that can be conceived as speaking. In such a sentence as "*I* am sick," in which the state, "sick," is affirmed about some one, the exact force of *I* may be thus expressed: The person of whom "sick" is affirmed is one with the person making the affirmation. Who the individual person is, the pronoun *I* gives no indication; it is implied that this is known from some other source. Those present learn it by hearing whence the sound comes; in a book, it is gathered from the context.

In like manner, *thou* is a generalized name for all persons spoken to. What it means or *connotes* is—with reference to the example above given—that the person affirmed to know the truth, and the person to whom the affirmation is addressed, are one and the same. What particular person it *denotes* must be learned, as before, from circumstances. If the clause, "*he* went away again," stood by itself, what person is denoted by *he* would be still more vague than in the case of *I* and *thou*. *He* merely implies that a person, neither the speaker nor the spoken to, but one known in some way, is the subject of the assertion. Who it is, is determined, in the example, by *John*, with which *he* stands in close relation. *Who* designates some person already named, referring us back to that name (the *antecedent*) for determining the individual. *What* connotes that the subject is unknown.

Pronouns are usually divided into personal and relative.

1. *Personal Pronouns.*—The several objects concerned in a speech or sentence stand in one or other of the three relations of speaker (first person), object spoken to (second person), object spoken about (third person). Pronouns expressive of these relations are called personal pronouns. They are (in the nominative case), 1st person, *I*, *we*; 2d, *thou*, *ye* or *you*; 3d, *he*, *she*, *it*, *they*.

Along with the personal pronouns, and most nearly related to the pronouns of the third person, may be classed the words *one* and *that* in certain constructions. In phrases like, "*One* cannot be sure of that," *one* is an indefinite pronoun, designating any person whatever. It is distinct from the numeral adjective *one*, being derived from the French *on*, which is a corruption of *homme*, man. When we say, "I like peaches, but let me have a a ripe *one*, or ripe *ones*," we have now the numeral used as another indefinite pronoun. The first of these indefinite pronouns is applied only to persons; the second, both to persons and things.

When we say, "Give me *this*, and keep *that*," *this* and *that* may be considered as demonstrative adjectives, with some noun understood—this (thing). But in the expression, "He mistook his own room for *that* of the stranger," *that* appears to be as much a pronoun as *one*.

2. *Relative Pronouns* (including *Interrogative*).—Relative pronouns, besides standing for nouns, have the power of conjunctions. They join sentences and clauses, by relating or referring back directly to something just named. The relatives in English are three—*who*, *which*, and *that*. See RELATIVE PRONOUNS.

What is used for *that which*, thus embracing both relative and antecedent. In phrases like "such a storm *as* now burst on them," *as* is used with the force of a relative pronoun. Perhaps the full expression would be "such a storm as (the storm that) burst."

3. *Interrogative Pronouns* are those used in asking questions; they are *who*, *which*, and *what*.

These are the *simple* pronouns. But a variety of compounds are formed by joining these simple pronouns with other words, such as *himself*, *whatever*, *any one*.

Pronouns, as we have seen, express the most abstract relations in language. They are, in fact, the most attenuated and colorless signs of thought conceivable—the highest effort, apparently, of man's generalizing powers. Accordingly, in the days of purely *à priori* speculation on the origin and growth of language, it was held to be indisputable that pronouns must have been the latest product of the language-making faculty; and they have been appealed to as a conclusive argument against the theory that the meaning of all words, when they are traced to their origin, is grounded on sensible properties and relations of material things. The philologist, on the contrary, pursuing his investigations on the historico-comparative method, sees irresistible proof that pronouns, in the Aryan family of languages at least, were among the earliest words in use. In fact, besides their independent use, the same elements are found as suffixes forming the inflections (see INFLECTION) of the predicative roots, and first making them real words capable of entering into a sentence. In the beginning, however, they were far from being the impalpable abstractions they afterward became, and really form the strongest proof of the theory they were supposed to upset. They were, in fact, simply demonstrative particles, indicating palpable relations of space or position ("that" or "there," "this" or "here," "what" or "where?"). We can easily see how the indication of the vocal sign would at first be helped out and made precise by gesticulation; or more probable still, the gesticulation was at first the fundamental sign, and the word a natural involuntary utterance accompanying it, and in process of time taking its place.

Of the various demonstrative radicals still traceable in the Aryan tongues as pronouns and suffixes, one of the most universal and outstanding is the sound *ta* or *sa* for "that" or "this," "there." It is seen in the Sanskrit *sa* (mas.), *sá* (fem.), *tad* (neut.); Lat. (is)*te*, (is)*ta*, (is)*tud;* Gr. *ho*, *he*, *to;* Goth. *sa*, *só*, *thata;* A.-S. *se*, *seó*, *thæt;* as also in the numerous allied adverbs, e.g., Lat. *tam*, *tunc;* Ger. *dann;* Eng. *so*, *as*, *then*, *thus*. Another demonstrative radical, *ma*, seems to have been used to call attention to the speaker—to point to the immediate or central "here;" in short, to the "me." Besides occurring in the oblique cases of the first personal pronoun, the element *ma* or *m* enters largely into the suffixes of the first person of verbs in the older languages, such as Greek and Latin. The only remnant of it in English is in *I am*. The nominative case of the first person pronoun in Sansk. is *ahám*, which is conjectured to be a mutilation of a fuller form *ma-gha-m;* in Gr. and Lat. *ego*, Goth. *ik*, Ger. *ich*, A.-S. Eng. *I*, Ital. *io*, Fr. *je*, the *m* has completely disappeared. In the oblique cases it has been better preserved. The root of the 2d pers. pron. seems to have been the syllable *tu* or *tva*, indicating a position intermediate between the central "here" and the more distant and contrasted "there." The form of this pronoun is more constant throughout the allied languages than that of any other: Sansk. *tvám*, Lat. *tu*, Gr. *ty* or *sy*, Ger. *du*, Eng. *thou*, Fr. *tu*, Ital. *tu*.

The pronouns of the first and second persons are invariable in respect of gender, and are never used as adjectives; the pronouns of the third person not only take the form of adjectives in respect of gender, but are often—especially in the older languages—joined to nouns, in which case they are rather demonstrative (or relative) adjectives than pronouns; as Lat. *ille homo*, Eng. *that* "*man.*" It is difficult to trace any etymological relations between the singular and the plural in the first and second pronouns—e.g., between Lat. *tu* and *vos*, or Eng. *thou* and *you;* but this is not to be wondered at when we reflect that "we" is not equal to "I" and "I," but to "I" and "he," or "I" and "thou;" and that "you" is as much "thou" and "he" as "thou" and "thou." The plurals must therefore have been compounded of several elements, which, by coalescence and abrasion, have become irrecognizable.

The declension of the English personal pronouns is to be found in any elementary grammar. That of the third person is made up of fragments of several Anglo-Saxon words. The Anglo-Saxon pronoun was thus declined:

Sing.	Nom.	*he* (he),	heó (she),	*hit* (it)
	Gen.	*his*	*hire*	*his*,
	Acc.	hine	hi	*hit*
	Dat.	*him*	*hire*	him
Plur.	Nom. Acc.		hi	
	Gen.		hira (heora)	
	Dat.		him (heom)	

The cases marked in italics are still used in modern English, only that *him* and *her* do duty in the accusative as well as dative. *His*, as the genitive of the neuter, has been supplanted in recent times by the secondary genitive *its*, a word which does not occur once in the English version of the Bible. *She* does not represent the Anglo-Saxon *heó*, but *seó*, the feminine of the article. The modern plurals *they*, *their*, *them*, have no direct etymological connection with the singular *he* (she, it); they are taken from the demonstrative or article *thæt* (that, the), which has, in the plural, nominative and accusative *thá*, genitive *thára*, dative *thám*. *Them*, like *him*, was thus originally a dative case. Is it a lingering memory of the demonstrative origin of *them* that keeps alive the vulgar error of "them things?"

Such being the arbitrary, or rather chance way in which the English pronominal system has been built up out of the wrecks of the Anglo-Saxon, there is no good reason why *them*, *him*, *her*, should not have been used in the nominative as well as in the accusative; and, in fact, in certain connections, these forms, together with *me*, are habitually so used, although grammarians have hitherto refused to sanction the usage. Such expressions as, "It is me;" "better than him, than them," etc., are not confined to the uneducated; in familiar conversation the most cultivated use them habitually, and in preference to what are considered to be the correct forms, which are felt somehow to be stiff and pedantic. This usage has the analogy of the French in its favor (e.g., *c'est moi*), and some English philologists have begun to defend it on principle. See Alford, *The Queen's English*

From politeness and other rhetorical motives, various substitutes take the place of the usual personal pronouns. The English language departs little from the normal usage, except in *you* for *thou*, and in the regal and editorial *we*. A French shopkeeper, instead of "What do you wish to see?" says: "What does the gentleman (or lady) wish to see?" All modern languages use such substitutions as, "Your majesty, your excellency, wishes;" but the Italian, in speaking further of the excellenza, says: "It (*ella*, she) wishes." The Germans use regularly *they* (*sie*) for *you*, and one never hears *you* except from the pulpit. In Hebrew politeness took the form of saying: "Thy servant said," for "I said." Similarly, the Chinese use: "little man, subject, thief, blockhead," for "I;" and an American backwoodsman speaks of himself as "this 'oss," or "this here child."

PROOF. See EVIDENCE.

PROOF OF FIRE-ARMS. Guns of all descriptions are proved before being issued for service. Muskets are tested by being fired with heavier bullets and larger charges of powder than they will in the ordinary way be required to carry. Cannon are subjected to a series of tests. First, they are gauged to ascertain that the dimensions are correct, the utmost variation permitted being .3 in. externally, and .033 in the diameter of the bore; but the position of the bore may deviate .25 in. from the line of the piece's axis. The next trial is by firing twice with heavy charges—the bore being subsequently minutely examined, to detect flaws or crevices in the metal. A cavity exceeding in depth .2 in., if behind the first re-enforce ring, or .25 if before that ring, condemns the piece. After the proof by firing, water is forced at a great pressure into the bore, in order that it may permeate any honeycombs or flaws; the next day the bore is examined by means of a mirror, which casts a strong light into it. Flaws are then easily detected; for while the rest of the bore is thoroughly dry, water will continue for some time to weep or run from the holes, and will stand over them in drops. This operation completes the proof. When a gun bursts in proof, the remainder of the guns of the same sort then in proof are subjected to another round.

In the case of guns of hitherto untried form, some are tested to bursting, as specimens of the power and endurance of the whole number. For proof of powder, see EPROUVETTE.

PROPAGANDA (Lat. *De Propaganda Fide*, regarding the propagation of the faith), the name of a congregation, and also of a college, in Rome, the object of which is to direct and forward the propagation of the Catholic religion, especially among the heathen; although Christian dissenters from the Roman church are also included in the sphere of its operations. The institution was originated by pope Gregory XIII. (1572–84): but it was fully organized by Gregory XV., who, by a bull of June 22, 1622, established a special congregation for this purpose, which his successor, Urban VIII., extended and endowed, and to which he annexed a college for the education of missionaries to the several countries; one great feature of which has been to provide for such work natives of the several countries, who are conveyed to Rome at an early age for the purpose of being specially educated in all the necessary learning of a missionary. The congregation consists of a number of cardinals appointed for life, one of whom is prefect, and who are assisted by a secretary, and by a number of consulters, clerks (*minutanti*); and other officials. This congregation conducts the affairs not only of the missionary countries, properly so called, but also of those—as England, the northern kingdoms, etc.—in which the hierarchical organization is not, or has not been full and formal. The Catholic church in these kingdoms is directly subject to the propaganda in all the details of its government. The college of the propaganda is a noble institution, containing nearly 200 pupils of all countries, tongues, and complexions, who are not only maintained and educated gratuitously from a very early age, but are equipped and sent forward to their several destinations at the charge of the institution. The operations of both college and congregation have been somewhat embarrassed by diminution of funds, consequent on the appropriation of ecclesiastical property to public purposes in the kingdom of Italy; but the want is in a great measure supplied by voluntary offerings. The propaganda college contains a most valuable library and museum, and a polyglot printing-press. Its great festival is the epiphany of our Lord, or of his "manifestation to the Gentiles;" and this feast is celebrated by an exhibition of exceeding interest and curiosity, in which are delivered recitations in every language represented in the college or its missions, amounting often to 50 or 60. Of this festival the celebrated cardinal Mezzofanti (q.v.) used to be the guiding spirit. It continues to be one of the chief literary sights of the Roman winter.

PROPAGATION OF THE FAITH, ASSOCIATIONS FOR ROMAN CATHOLIC. The earliest and the highest in dignity of these has been already described under the head PROPAGANDA (q.v.). But the present century has produced several private associations, the resources of which arise almost entirely from voluntary annual contributions, and the organization of which is most complete and most extensive. The first of these is that founded at Lyons in 1822, under the title "Œuvre de la Propagation de la Foi," with a branch at Paris, and subordinate branches in the other Catholic kingdoms. It is under the direction of a council at Lyons and Paris, which communicates as well with the local associations through which the funds are supplied by small weekly, monthly, or yearly contributions, as with the missions to the aid of which the fund so raised is applied, by an apportionment regulated according to the necessities of each, especially for the supply of missionaries. The piety of contributors is stimulated by the exhortations of the popes, and the granting of indulgences to those who, with the other requisite dispositions, shall aid in the work. The journal of the society, entitled *Annales de la Propagation de la Foi*, is a very interesting bi-monthly collection of letters and reports in French from the different missions connected with the central body. The receipts of this association for the year 1863 were 4,788,496 fr., 86 c. Of this sum, by far the largest proportion was raised in France—3,307,248 fr. Italy came next, though at a long interval, contributing 420,653; Belgium gave 271,597; Germany, 251,873; the British islands, 127,000. The Franco-German war and the changes in Italy produced some diminution of this revenue; but some later years' returns have been even more considerable. Spain, once the great propagator of the Gospel in the New World, contributes very little: but it is to be observed that Spain maintains for her own missionary enterprises a large and liberal establishment in connection with the mission of the Philippines and the South Sea.

Another association of somewhat later date is the "Leopoldiner-Verein," established at Vienna in 1829, for general purposes, but the chief object of which is to assist the missions of German origin, especially in America. This association also has its own journal, entitled *Berichte der Leopoldiner Stiftung.* It is under the presidency of the archbishop of Vienna, but has extensive foreign relations. A third is that established in Bavaria as an offshoot of the Lyons association, under the name "Ludwigs Missions-Verein." Like that of Vienna, its chief, although not exclusive object, is the support of German missions. The Ludwigs-Verein is conducted under the auspices of the archbishop of Munich. All these associatiations, although quite independent in their management and direction, nevertheless maintain close relations with the propaganda of Rome, and are often guided by the recommendations of the cardinal prefect in the distribution of their funds to particular missions.

PROPER, in heraldry. A charge borne of its natural color, is said to be proper. An object whose color varies at different times and in different examples, as a rose, which may be white or red, cannot be borne proper.

PROPERTIUS, Sextus Aurelius, an eminent Latin poet; b. as supposed about 56 B.C.; died 16 B.C. There are reasons for believing that his native place was Mevania, in Umbria. He belonged to the equestrian order, and his family was, like many others who had supported the cause of Antony, deprived by Augustus of their estate. Propertius studied at Rome intending to devote himself to the bar, but soon abandoned the law for poetry. He was the friend of Ovid, Mæcenas, and Tibullus. He left a collection of elegies divided into four books. In the first three he sings of his beloved Cynthia; the fourth is occupied chiefly with heroic and religious legends. He was sometimes called the Roman Callimachus. His elegies were formerly printed with those of Catullus and Tibullus, as in the *Editio Princeps.* The best later edition is that of Hertzberg, Halle, 2 vols. They have been translated into French, German, Italian, and into English by Oxford scholars.

PROPERTY, in law, the right and interest of a person in anything the subject of ownership. It must be a right exclusive of the right of others, for some things, as air, the sea, etc., cannot be exclusively enjoyed. Property is either real or personal. It is also absolute or qualified. Absolute property is what is owned without qualification; qualified property is that which a man has over wild animals in his power. Property in things personal may be qualified by the interest of more than one person in it, or by the separation of the possession from the right of property. Personal property is divided into property in possession, and choses in action. See Personal Property. Property is also divided into corporeal and incorporeal; the former comprehending tangible property, the latter rights in property. There are two kinds of qualified property limited in time—one for a definite period, one for the life of the tenant or some other person. Property is lost by operation of law, by abandonment, or by alienation. See Realty, Bailment.

PROPHECY (Gr. *propheteia*) is a word of pregnant signification. According to its usual acceptation in modern English, it implies *prediction*—the telling of events about to happen beforehand. But neither according to the original meaning of the word prophet in Hebrew (*nabi*) or in Greek (*prophetes*), nor according to historical usage of the verb *prophesy* in English, can such a meaning be considered exclusive. The etymological force of the Hebrew word, according to the best authorities, denotes "a person who, as it were, bursts forth with spiritual utterances under divine influence, or simply one who pours forth words." The *nabi* is the medium of special divine communication—according to some, the man inspired by God to whom divine communications are made; but more distinctively, according to others, the man who delivers the burden of the divine thought imparted to him, who makes known the declarations of God. Besides the more authoritative expression *nabi*, there are two other expressions (*roëh* and *chozeh*) used in the Hebrew original with something of the same meaning, and which are translated in our English version "seer." The exact meaning of the several words in their relation to one another has been much disputed. The best view, upon the whole, seems to be that which considers *nabi* to denote specially the official function of the prophet, the *order* to which he belonged; and the other expressions to point peculiarly to the nature of the prophetic gift—the intuition or vision of the divine. The one may stamp more the objective function of the prophet as a *teller* or *utterer* of the divine, the other more his subjective capacity as a seer of the divine.

The original and proper import of the word *prophecy,* therefore, may be said to be the utterance of the divine. The prophet is the "interpreter of the divine will." He is expressly called "the interpreter and the messenger of Jehovah." The idea of prediction is not of course excluded; but this idea is not a radical and necessary part of the meaning of the word, nor was it at all necessarily an element of the prophetic office. This is apparent from the use of the word even in our English Bibles and our older theological literature. The sons of Asaph, for example, it is said (1 Chron. xxv. 3) "prophesied with a harp, to give thanks and to praise the Lord," in the sense of merely singing or uttering God's praise under the dictate of the divine Spirit. It is said also of Philip the evangelist (Acts xxi. 9) that he had "four daughters, virgins, which did prophesy," in the sense merely or mainly of declaring the gospel. In like manner, Bacon speaks in his day of "an exercise commonly called *prophesying*," which consisted in the exposition of a portion of Scripture by successive ministers at a meeting appointed for the purpose; and the well-known title of one of Jeremy Taylor's books, *The Liberty of Prophesying*—i.e., the liberty of preaching—recalls the same use of the word.

Prophecy among the Jews was a distinct office or function constituted under the divine sanction. The prophets were an *order* instituted, or at least reformed and more thoroughly organized by Samuel. There were prophets, indeed, before; Abraham is called a prophet (Gen. xx. 7), and Moses also (Deut. xviii. 15; xxxiv. 10); Aaron is the "prophet of Moses" (Ex. vii. 1), and Miriam is "a prophetess" (Ex. xv. 20); but it was Samuel who first established the office as a systematic part of the Jewish religion. For this purpose, he gathered together companies of young men of promising spiritual attainments, who were trained under his superintendence for various religious duties—the exposition of the theocratic law, and the conduct of the theocratic worship, especially of its elaborate musical departments (1 Sam. x. 5; 1 Chron. xxv. 6). The use of the psaltery and tabret, pipe, harp, and cymbal, was the peculiar business of the prophets. The young men were set apart to make proficiency in these instruments; they were placed under an elderly head or president, who received the name of father, and they were called his sons. They were "all under the hands of their father for song in the house of the Lord, with cymbals, psalteries, and harps, for the service of the house of God" (1 Chron. xxv. 6). The prophetic institutions have been called by modern divines "schools of the prophets;" but this name does not occur in Scripture, nor even in our authorized version. "Sons of the prophets" is the only collective name applied to the separate companies into which they were formed by Samuel. These companies were located in special spots; in Ramah, the birthplace and residence of Samuel; in Bethel, Gilgal, Jericho, and ultimately Jerusalem. They lived in huts made of the branches of trees; wore a simple, characteristic dress; had their meals together, and were found in numbers sometimes of 50, sometimes even of 400. For a prophet not to have been trained in one of these institutions, was deemed as dean Stanley says (*Jewish Church*, vol i. p. 429), "an exceptional case." Some, like Isaiah in Jerusalem, or Elisha in Samaria, lived in great towns, in houses of their own. The higher prophets had inferior prophets or servants attendant upon them, whose duty it was to pour water upon their hands, and secure provisions for them (2 Kings iii. 11; v. 22). Thus Moses had Joshua and others; Elijah had Elisha; Elisha had Gehazi. Many of them were married, and had families; for example, Moses, Samuel, Deborah, David, Hosea, Isaiah, Ezekiel. The wife was sometimes, as in the case of Isaiah, called "the prophetess."

The prophets, according to this description, were a peculiar order of teachers among the Jews; prophecy, a distinctive part of the divine economy, by which God trained and educated the "chosen people." Beginning in a definite, though still unorganized form, with Moses (for it is only incidentally that Abraham is called "a prophet"), it assumes a regular organization in the hands of Samuel, just when the earlier form of the theocratic government was passing away, and the monarchy was established. It grew up alongside the older institution of the Levitical priesthood without any professed or formal opposition to the latter, but playing a part distinct, and often practically opposed to it. The priests ministered at the altars of sacrifice, and discharged all the official rites of purification enjoined by the Jewish law. They were only secondarily teachers of the people. The prophets, again, while joining in the rites of the tabernacle and temple, were primarily and mainly teachers. Their function was moral, and not ritual; they upheld the ethical, spiritual, and eternal side of religion, apt to be obscured under the hardening tendencies and ambitious officialism of an influential priesthood. They were the great preachers of a righteous government of the world, and of future retribution amidst the confusions and evils of their time; and prophecy was the ever-renewing and reforming element in the constantly corrupting and decaying policy of Judaism. More particularly, the prophets were both the national historians and poets of the Jewish people, the narrators of its past deliverance, the heralds of its coming glories. The books of Joshua, Judges, Samuel, and Kings are included among the prophetical books of the Old Testament in the Jewish canon; while the acts of David, by Gad and Nathan, of Solomon and Jeroboam, by Nathan and Iddo, along with other historical and biographical pieces, have unhappily perished. It is needless to point to the splendid collection of the later prophetic books, beginning with Joel, as containing, along with much direct historical matter also, the most exalted specimens of poetry to be found in any language.

But that which by many has been supposed to be the distinctive character of prophecy, and the special function of the prophets, remains to be noticed. According to the general view of theologians in modern times, prophecy is peculiarly *predictive*, and the essential characteristic of the prophet is supposed to be the power of *foretelling future events*. This view is not warranted, we have seen, either by the etymology of the word, or a comprehensive survey of the facts; but it is, nevertheless, undeniable that the Hebrew prophets directed their attention especially to the future, and "made predictions concerning the fortunes of their own and other countries which were unquestionably fulfilled." "There can be no reasonable doubt, for example," writes one of the most liberal of modern theologians, "that Amos foretold the captivity and return of Israel, and Micah the fall of Samaria, and Ezekiel the fall of Jerusalem, and Isaiah the fall of Tyre, and Jeremiah the limits of the captivity. It was the distinguishing mark of the Jewish people," adds the same writer, "that their golden age was not in the past, but in the future; that their greatest hero (as they deemed him to be) was not their founder, but their founder's latest descendant. Their traditions, their fancies, their glories, gathered round the head, not of a chief, or warrior, or sage that had been, but of a king, a deliverer, a prophet, who was to come. Of this singular expectation, the prophets were, if not the chief authors, at least the chief exponents."* The reality of a succession of Messianic predictions is admitted by even very advanced theologians; and the more usual opinion, it is well known, regards these predictions from the time of Moses to the time of Malachi as admitting of no question, from the supposed clearness, fullness, and particularity with which they announce a deliverer, and describe his functions. "That salvation should come through the family of Abraham, Isaac, Jacob, Judah, David; that at the time of the final absorption of Jewish power, Shiloh (the tranquilizer) should gather the nations under his rule; that there should be a great prophet typified by Moses, a king descended from David, a priest forever typified by Melchizedek; that there should be born into the world a child, to be called Mighty God, Eternal Father, Prince of Peace; that there should be a righteous servant of God on whom the Lord should lay the iniquity of us all; that Messiah, the Prince, should be cut off, but not for himself; that an everlasting kingdom should be given by the Ancient of Days to one like the Son of Man. It seems impossible to harmonize so many apparent contradictions. Nevertheless, it is an undoubted fact, that at the time seemingly pointed out by one or more of these predictions, there was born into the world a child of the house of David, and therefore of the family of Abraham, Isaac, Jacob, and Judah, who claimed to be the object of these and other predictions; who is acknowledged as Prophet, Priest, and King, as Mighty God, and yet as God's righteous servant, who bears the iniquity of all; who was cut off, and whose death is acknowledged not to have been for his own, but for others' good; who has instituted a spiritual kingdom on earth, which kingdom is of a nature to continue forever, and in whose doings and sufferings on earth a number of specific predictions were fulfilled. Then we may say that we have here a series of prophecies which are so applicable to the person and earthly life of Jesus Christ, as to be thereby shown to have been designed to apply to him; and if they were designed to apply to him, prophetical prediction is proved."—Smith's *Dictionary of Bible*, art. Prophecy.

Such is the common view of prophecy. It has, indeed, been maintained by certain writers that *literal prediction* has no place in prophecy: that Isaiah did not foretell the Babylonian captivity, or the fall of Tyre, nor Jeremiah the seventy years' captivity, nor Nahum the ruin of Nineveh; and that the Messianic prophecies were merely "ardent hopes and poetical descriptions" of a glorious future, into which the prophetic mind naturally projected itself. Such delineations were "in essence nothing but *forebodings*—efforts of the spiritual eye to bring up before itself the distinct form of the future: to make such presentiments into *historical declarations* is to mistake their character."—Davidson's *Introduction*, vol. iv. But this is not the ordinary theory of prophecy, either among Jews or Christians. Both alike recognize the reality of the predictive element, however differently they may interpret and apply the prediction. They contend not only for a special spiritual elevation in the prophet—an intenser degree of the same divine intuition which God gives to all who worship him in love and reverence—but for a gift of light vouchsafed to him different from any ordinary endowment. Prophecy is not merely the effluence of the divine Spirit enriching and exalting all the natural faculties, but it is the direct communication of God himself, to the prophet unveiling the future for the guidance of his church, and the glory of his name.

The further study of the subject may be pursued by readers in numerous volumes, among which the following may be recommended: John Smith, *Select Discourses on Prophecy;* Lowth, *De Sacra Poesi Hebræorum;* Davison, *Discourses on Prophecy;* Butler, *Analogy of Religion;* Horne, *Introduction to Holy Scripture;* Eichhorn, *Die Hebräischen Propheten;* Ewald, *Die Propheten des Alten Bundes;* Hengstenberg, *Christology of the Old Testament;* Fairbairn, *Prophecy;* Davidson, *Introduction to the Old Testament;* Stanley, *Lectures on the Jewish Church.*

PROPOLIS, a substance used by bees in the construction of their combs, to give to the fabric a strength which it could not have if made of wax alone. See **Bee**. It is also used for closing up chinks of the hive. It is a resinous unctuous substance of a reddish-brown color, a somewhat bitter taste, and an agreeable aromatic odor, and is collected from the buds of trees. Huber found bees eagerly to appropriate the viscous exudation which abounds on poplar buds. Propolis probably differs a little in chemical composition according to the tree it is obtained from, but it consists chiefly of resin. It is brought to the hive on the legs of bees, and adheres to them so strongly that the assistance of other bees is necessary for its removal. The name is from the Greek *pro*, before, and *polis*, a city; because the most exposed parts of a bee-hive exhibit this substance in greatest abundance. Foreign bodies introduced into a bee-hive, and which the bees are unable to remove, are covered with propolis.

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* Dean Stanley, *Jewish Church*, vol i. p. 466.]

PROPONTIS. See **Marmora, Sea of**, *ante*.

PROPORTION, in arithmetic and geometry, is a particular species of relation subsisting between groups of numbers or quantities. Notwithstanding that the idea of proportion is found to exist in perfection in the mind of every one, yet a good definition of it is a matter of extreme difficulty. The two definitions which, on the whole, are found to be least objectionable are that of Euclid, and the ordinary arithmetical definition. The latter states proportion to be the "equality of ratios," and throws us back on the definition of the term *ratio* (q.v.); which may most simply be considered as the relation of two numbers to each other, shown by a division of the one by the other. Thus, the ratio of 12 to 3, expressed by $\frac{12}{3}$, or 4, denotes that 12 contains 3 four times; and the ratio of 8 to 2 being also 4, we have from our definition a statement that the four numbers, 12, 3, 8 and 2, are in proportion, or, as it is commonly expressed, 12 bears to 3 the same ratio that 8 does to 2, or 12:3::8:2. In the same way, it is shown that 3:8::13½:36; for $\frac{3}{8}$ expresses the ratio of the first to the second, and $\frac{13\frac{1}{2}}{36} = \frac{27}{72} = \frac{3}{8}$. It will be gathered from the two arithmetical proportions here given, and from any others that can be formed, that "*the product of the first and last terms* (the *extremes*) *is equal to the product of the second and third terms* (the *means*);" and upon this property of proportional numbers directly depends the arithmetical rule called "proportion," etc. The object of this rule is to find a fourth proportional to three given numbers, i.e., a number to which the third bears the same ratio that the first does to the second, and the number is at once found by multiplying together the second and third terms, and dividing the product by the first. Proportion is illustrated arithmetically by such problems as, "If four yards cost six shillings, what will ten cost?" Here, 15 being the fourth proportional to 4, 6, and 10, fifteen shillings is the answer. The distinction of proportion into *direct* and *inverse* is not only quite unnecessary, but highly mischievous, as it tends to create the idea, that it is possible for more than *one* kind of proportion to subsist. *Continued proportion* indicates a property of every three consecutive or equidistant terms in a "geometrical progression" (q.v.)—for instance, in the series, 2, 4, 8, 16, 32 . . . , 2:4::4:8, 4:8::8:16, etc., or 2:8::8:32, etc. In the above remarks, all consideration of *incommensurable quantities* (q.v.) has been omitted.—The definition given by Euclid is as follows: Four magnitudes are proportional, when, any equi-multiples whatever being taken of the first and third, and any whatever of the second and fourth, according as the multiple of the first is greater, equal to, or less than that of the second, the multiple of the third is also greater, equal to, or less than that of the fourth—i.e., A, B, C, D are proportionals, when, if mA is greater than nB, mC is greater than nD; if mA is equal to nB, mC is equal to nD; if mA is less than nB, mC is less than nD; m and n being any multiples whatsoever. The apparent cumbrousness and circumlocution in this definition arise from Euclid's endeavor to include incommensurable quantities; throwing them out of account, it is sufficient to say that four magnitudes are proportional, if, like multiples being taken of the first and third, and like of the second and fourth, when the multiple of the first is equal to the multiple of the second, the multiple of the third is equal to the multiple of the fourth. Abundance of illustrations of the general definition will be found in the fifth book of Euclid, and of the particular one in the notes appended to some of the later editions of the same work; it will be sufficient here to give an arithmetical instance of the working of the particular definition. Taking the four numbers of a previous example—12, 3, 8, 2; of 12 and 8 take multiples by 4, and of 3 and 2 by 16, then 12 × 4 (the multiple of the first)=3 × 16 (the multiple of the second), and 8 × 4 (the multiple of the third)=2 × 16 (the multiple of the fourth). In this example, the two multiples were so taken that the multiple of the first would be equal to the multiple of the second, and when it was found that the multiple of the third was also equal to the multiple of the fourth, the proportionality of the four numbers was established.

PROPORTION IN ÆSTHETICS, the relative size and form of the several parts of any object which conveys the most pleasing effect to the eye and satisfies the mind as to its adaptedness to its evident use: also, applicable to groups of associated objects in their harmonious juxtapositions. The effort to find some invariable law of proportion for all objects, like those which are used in the exact sciences, is not likely to succeed, and springs rather from the desire to have a creed in art than a principle. The snow-flake crystal is an illustration of perfect proportion and perfect symmetry; but snow forms an infinitude of utterly dissimilar crystals, so that, were we to endeavor to fix upon the perfect snow-crystal, or the law of proportion in the perfect snow-crystal, we should meet the difficulty that runs through all nature—that the laws will be as numerous as the subjects which they govern. Therefore, each subject is "a law unto itself." An approximation to a principle of proportion may be made in many things by our experience in comparing the pleasure we receive from one series of proportion rather than another, and the evidence which we have that one proportion is better adapted to its work than another. It is a branch, therefore, of comparative anatomy in which all the things of the universe are to be analytically examined to find the reason for the sensations which they produce in the mind. A German writer, A. Zeising, has assumed a principle of proportion as of universal applicability, viz., that the several parts of objects must be to each other in proportions like a line divided into two parts, of which the shorter shall be to the longer as the longer is to the whole; or, stated in another way, so that the larger part of any body shall be a mean between its smaller part and its entirety. The application is made to the human form, and it is not difficult to fix upon points of division so as to make the parts conform to the rule and seem to show its invariability. The rule may be of value in the arts, but it falls far short of being a general law of beauty of proportion. Observe the wide diversity of tree forms. We derive lively sensations of beauty from all their diverse variety of proportions. By what stretch of ingenuity can we apply that law to govern their proportions that will not be contradicted by half of those forms which give equal pleasure? A broad-headed low elm full of grace, symmetry, and strength; a palm in the tropics, with a slender tuft of waving leaves near its lofty summit; the young elm of the forest border, tall and picturesque and as unlike its mature type as possible; evergreen trees that sweep the ground with great breadth of pendant branches diminishing to a spiry top; and trees of the same family that rear columnal trunks of immense magnitude to carry a small top,—in all these wide diversities of proportion the mind is impressed equally with the beauty of proportion of each separate type. Our æsthetic perceptions of proportion are intellectual. They exact that the thing which we admire must be proportioned to its use. The broad-branching elm has grace and beauty not derived from the value of its shade, yet we instinctively recognize the merit of its breadth of shade and credit it with better proportions as it fulfills this use. The young elm of the forest border, with its straggling thrifty shoots pushing wildly about as if undetermined what form of tree they were created to make, affording little shade and less symmetry, is nevertheless pleasing by its picturesqueness. "It is out of all proportion" some might say. But, more intelligently viewed, it is animate with the growth peculiar to its youth. The student and lover of trees finds it a charming specimen; a perfectly proportioned *young* elm,—much as a physician speaks of a child at birth as a perfectly proportioned child, though the proportions would be hideous if maintained to maturity. The statue of Hercules in the garden of the Tuileries is a marvelously well-proportioned, but abnormal development of the muscular system; but it is a monstrosity if made to represent a normal man. Take, for instance, the figure of a dancing-girl with the vigor of life and action rendered by modern sculptors. The combination of grace, muscular force, and mental nerve exhibited are such that any ordinary observer will be struck with its beauty of proportion, its supreme life-fullness. But what is the instinct in the unreasoning man which tells him, at a glance, that that work is perfect in its proportion? It is that there is concentrated in one figure before him all the possibilities of beauty and power and activity which he has seen now and then around him all his life, but not in one form before. Let a savage stand before a statue of a muscular Hercules and he will be at once and powerfully impressed with its perfection, and would be very likely to worship it as a god. But place him before a spiritual conception in sculpture of some high moral attribute only, and he will show little sense of its beauty of proportion. Thus, proportion is not a fixed rule of form, but an impression on the mind according to the quality of the mind itself, and to the objects whose impression the mind has been educated to take. The machinist who studies the mechanism of pumps will see beauties of proportion in the parts of a machine that the sewing-machine man could not see, and *vice versa*. Outside of our own kind no animal interests so much by its beauty and proportions as the horse. Ask a London dray-man to select the most finely proportioned horse, and he will in all probability select for his model a dray horse. Ask the hunter to do the same, it will be the finest hunting-horse; the turfman, a racer; and the highland boy will choose a shaggy pony. This again shows that our education molds the rule of proportion in every case.

Architecture ought to be more the subject of rule in proportion than any other fine art. Its lines are all geometrical. Its constructions conform to geometric and mechanical laws of the most truly scientific character. But when we come to its effects on the eye we find that, as in nature, each construction is a rule unto itself. The Greek temples that men accepted as unique perfections in architecture an hundred years ago, and sought to crown with the attribute of perfect proportions, are perfect, as every well-grown tree of its species is perfect, without proving that every other species of tree has not equally perfect specimens of widely different proportions. The Gothic architecture, about which fanciful and absurd theories have been advanced as to its being suggested by the interweaving branches of avenues of trees whose trunks were the columns and their branches the arching ribs that formed the models, in reality grew by the commonest clumsy processes of elimination by mechanics of the weaker and more expensive Roman arch by the arch suggested by the crossing of two circles. The novelty alone of the new form would give it an active growth. Its strength and capabilities were discovered afterward, and the beauties of proportion found in the great works of its perfecting era are utterly discordant in their variety. Compare, for instance, the façade of Westminster abbey and Notre Dame of Paris. Both main façades have towers on a similar plan. But the latter is noble to a degree that is wanting in the former. Both are good Gothic Both are pleasing. The Notre Dame façade has level lines crossing its front with a boldness that is peculiar to it. In theory they might have spoiled the unity of the style: in fact, they add to its expression. But to such great works, there ought, we may suppose, to be some definite law of proportion between the parts—between the length, the breadth, and the height; between the towers and spires and the main body. But we find cathedrals where the church part is subsidiary to the towers—hid behind the façade as in the cathedrals of Ulm and Amiens, in France, and the effect is superb; we would not have them differently proportioned. Again, the towers are subsidiary, till the mass loses boldness of expression. But who can define where change in proportion shall cease to vary? The new parliament house in England is a remarkable example of bold and lofty towers breaking up from long level palace lines. By what rule could the student for "a law of proportion" govern the relation of these parts? Frequently, the wider the divergence from some supposed law of harmonious proportion, the more pleasing the result. This does not prove that there can be no law of proportion, but only that the law is an endless book, the preface to which is made by the experiments of the past, and the body of the volume yet to be made by experimenting and comparing effects, to the end of time, to develop all the laws of proportion that the universe illustrates.

The words symmetry and proportion are often used as interchangeable terms. A difference in æsthetics is this: that while symmetry suggests the balance of similar parts, good proportion alone may not be violated by the association of parts not similar. A building, for instance, may have a center with two wings balancing each other as to size and form, so that the whole is a well-proportioned edifice. But if one of the wings have Gothic windows, the other Roman, and the center Greek, it would certainly be an unsymmetrical building. The absence of proportion and symmetry often produces picturesqueness—as of a tree bent and growing to one side; but the three qualities may all be united in one object, as in a tree with very bold irregularity of branches and outline, yet as a whole well balanced on its trunk, and symmetric because of the general similarity of its growth on all sides. The parliament houses in London furnish an architectural example wanting in the United States of the union of proportion, symmetry, and picturesqueness.

PROPORTIONATE REPRESENTATION. See REPRESENTATION, in politics.

PROPOSITION. This is the technical name for the final constituent or ultimate element of whatever we call knowledge—what we can believe or disbelieve. "Fire melts wax;" "the harvest is good;" "Rome stands on the Tiber;" "the moon is not inhabited"—are propositions. All information, whether historical, scientific, or practical, may be resolved at last into simple statements such as these; and all such statements are propositions. In every proposition there are two parts: something spoken about, called the subject; and something said, affirmed, or declared of what is spoken about, called the predicate. In the first example given "fire" is the subject, "melts wax" is the predicate or affirming part, to which a verb is necessary. In the second example "harvest" is the subject, "is good" the predicate. But sometimes this last part is resolved further into predicate (good) and copula (is). The predicate then simply means the quality or fact affirmed, while the copula gives the affirmation. In the previous case the copula is contained in the predicate (melts).

Propositions are *affirmative* or *negative*, according as we declare that a thing is, or that it is not; "the moon is (not) inhabited." As some propositions contain the form of a condition, and some the form of an alternative, these are called *hypothetical*, in opposition to which the rest are called *categorical*. If A is B, C is D, is the *conditional* form of the hypothetical class. Either A is B, or C is D, is called the *disjunctive* form.

Propositions are further divided, according to their quantity, or according to the extent of the subject, into *universal*, *particular*, *singular*, and *indefinite*: "*all* the moving powers are originally derived from the sun" (universal); "*some* men are wise" (particular); "*Socrates* is wise" (singular). The "indefinite" means the uncertain or ambiguous in form, as "wine is good;" many of this form are known to be universal, as "man is mortal."

In inquiring into the ultimate import or meaning of propositions, Mr. John Stuart Mill came to the conclusion that they fall under five classes, distinguished according to the nature of the quality predicated. The five universal and comprehensive predicates are—existence, co-existence (sometimes taking the form of order in place), succession (order in time), causation, resemblance. Every fact, or piece of information consists in the affirmation of some one of these five general attributes. Existence by itself expresses a very limited class, since we usually specify circumstances of time, place, etc., in the same assertion: "There is an ether for conveying light and heat," is a proposition of existence; but it would be more usually stated as having locality (order in place, or co-existence), "an ethereal medium is diffused over all space." Existence is the only one of the five attributes that can be affirmed of one thing; all the rest require at least two things. The attribute of co-existence appears in a very large number of propositions: all geographical statements and local descriptions; all the natural conjunctions of properties (the animal frame consists of digestive organs, a nervous system, etc.), affirm co-existence. The attribute of succession is seen in history, and in all the changing aspects of things. The attribute of causation is a special case of succession, so important as to be raised to the rank of a first-class predicate. The facts of physical and mental science involve not merely succession, but cause and effect: "Heat expands bodies;" "practice improves the human faculties." The concluding attribute—resemblance—is of very wide occurrence. The propositions of numerical or mathematical science all involve some assertion of equality or inequality, proportion or disproportion: "Twice three is (equal to) six;" "triangles in the same base and between the same parallels are *equal.*" Throughout all our knowledge, the affirmation of likeness, or of unlikeness, is a fundamental fact; but in mathematics it constitutes the characteristic predicate, or the sole affirmation.

PROROGATION, the continuance of parliament from one session to another. Parliament is prorogued by her majesty's command, signified in her presence by the lord chancellor, or speaker of the house of lords, to both houses, or when her majesty is not personally present, by writ under the great seal, or by commission. Prorogation not only suspends all business, but quashes all proceedings pending at the time, except impeachments by the commons and writs of error and appeals before the house of lords. A bill must be renewed after a prorogation, as if it had never been introduced. A prorogation for a single day has sometimes been resorted to to enable a bill to be brought in a second time, it being a rule that no second bill of the same substance with a prior one, can be introduced in the same session. Thus parliament was prorogued by William III. from Oct. 21 to 23, 1689, in order to renew the bill of rights, regarding which a difference had arisen between the upper and lower house that was fatal to it. By 37 Geo. III. c. 127, after parliament had been prorogued to a particular day, her majesty may, by proclamation, call it together on any other day, not less than 14 days distant, to which day parliament then stands prorogued. See PARLIAMENT.

PROSECUTION, though often used in a general sense, as applicable to all kinds of litigation, is also used technically to denote the institution of criminal proceedings against a party. There are two ways in which a prosecution commences in England. One is to summon, or, in the graver cases, to arrest and bring the offender before a justice of the peace, when the witnesses are examined, and if the justice thinks a *primâ facie* case is made out, he commits the offender for trial. Another way is without any such preliminary inquiry before a justice, for the prosecutor to go with witnesses before a grand jury, and in all cases this is a step in the prosecution. The grand jury hear the witnesses, and if they think there is a *primâ facie* case, they find a true bill; if otherwise, they ignore the bill. The bill means an indictment. When the indictment is found, the prisoners are arraigned at the bar, and asked by the judge whether they plead guilty or not guilty; and in general they plead not guilty. A jury of twelve men are then sworn, and try the case, and find a verdict of guilty or not guilty; if the former the judge sentences the prisoner to punishment, which varies according to the enormity of the offense. In general, a new trial cannot be held in criminal cases, though, if an error is committed, the conviction is often quashed.

PROSECUTOR is the person who takes the initiative in punishing crimes. In England there is no public prosecutor, and the prosecution of crimes is left to the spontaneons action of the injured party. Hence it often happens that many crimes go unpunished, for the mere want of its being anybody's business to attend to this part of the public interest. It is true that the attorney-general is sometimes the prosecutor on behalf of the public; but this only happens in rare and exceptional cases connected with political government or some monstrous and abnormal crime. In all cases, therefore, it may be accurately stated that it is left to the uncontrolled discretion of anybody to commence a prosecution, however great a stranger to the circumstances. But though he may take the initiative, yet in the ordinary course, a stranger seldom undertakes such a duty, and for very sufficient reasons. If a party is robbed by a servant or clerk, or by burglars, he naturally desires to prosecute them; if a person is murdered, some one of the relatives naturally prosecutes. Therefore, there is in most cases a sufficient motive impelling some party, or friend of the party injured by the crime, out of mere revenge, if for no other reason, to commence a prosecution. But it follows that, as there is no public prosecutor, and as he who acts as such is a volunteer, he does so more or less at his own expense, and in the first instance must always do so. He must employ his own attorney and counsel, who, of course, require to be paid for their services. It is true that the expenses of prosecuting most crimes are supposed to be ultimately repaid by the county in which the trial takes place; but this allowance is a wretched pittance, and is seldom one-fourth of the real expenses incurred by the private prosecutor. Hence, in the end, the prosecutor finds that he loses a great deal of money as well as time in carrying on a prosecution. Indeed, in practice, the result is, that no person to whom his money is of much consequence ever prosecutes a second time, and the first time he almost invariably does so in ignorance of the pecuniary result, there being a vague kind of popular belief that the expenses are repaid. Few people, indeed, fail to repent of embarking in such a litigation; and the prudent and experienced are in the habit of remarking, that prosecutions are only kept going by the unbroken succession of young and inexperienced persons who do not know better. A person who prosecutes a small larceny of five shillings may incur expenses of from five to fifteen pounds, which is money out of pocket when his attorney's bill is paid. But not only is there great expense and loss in the mere prosecution itself; there are far more grievous consequences. If it happen—and it seems in about half of the cases it really does happen—that the prisoner is not found guilty, or the case breaks down from defective evidence or otherwise, the first thing that the prisoner does is to bring an action for false imprisonment, or for malicious prosecution, against the prosecutor. It is said that attorneys infest all the police courts and petty sessions, by keeping an organized service of watchers to pick up cases of this kind, which are called speculative actions. The speculative attorney promises to take the chance of gaining the action, and, of course, as it costs the prisoner nothing, he readily lends his name, and, out of revenge, joins keenly in the attempt to recover large damages. It is true that in all such cases the prosecutor ought not in theory to lose the verdict, if he acted under a reasonable and honest belief that a crime had been committed; but, however plausible this defense may be in theory, it is a very different thing to establish it in practice. At the trial of the action, counsel on such occasions enlarge on the monstrous oppression of having given an innocent man into custody, blasting his character and reputation for life, and attributing the prosecution to spite or malice; and as the presumption is always in favor of innocence, it is astonishing how easily a jury may be led away by a spurious sympathy in favor of the quondam prisoner. It is thus entirely a lottery in such cases how the verdict will go, and verdicts of ten, fifty, or a hundred pounds of damages are often obtained, simply because of the accidental defect of some conclusive piece of evidence, with which the defendant in the action had probably no more to do than any other person. When the quondam prosecutor is a person of substance and position—and, of course, a speculative attorney will not sue those who are not so—he often finds it prudent to compromise the action by paying a lump sum, rather than run the risk of a trial. Many attorneys in the metropolis and large towns of England carry on a large and lucrative business by systematically bringing these speculative actions against unsuccessful prosecutors. The evils of this state of the law have been often complained of, but have not yet been remedied, probably because other systems of prosecuting crime are open to objections.—In Scotland, a well-settled system of public prosecutors has long been in operation, which avoids most of the evils already described. The lord-advocate is *ex officio* the public prosecutor, and there are counsel called advocates-depute who assist him, besides a local functionary called a procurator-fiscal (q.v.) in all parts of the country. The public prosecutor's duty and business is to act on all reasonable suggestions that a crime has been committed, but he is not compelled to prosecute. If he refuse to do so, a private party may at his own risk, with the concourse of the lord-advocate, insist on the prosecution; but he may be called on to find caution or give security. The usual course is for the procurator-fiscal to take the precognitions; i.e., the examination of witnesses before the sheriff, a copy of which is laid before the crown-counsel, and if they are satisfied that a *primâ facie* case is made out, the proceeding is carried on to trial; but if there is not sufficient evidence, the prisoner is ordered to be at once discharged. The entire expense of prosecuting crime in Scotland, whether at the higher or local tribunals, is borne by the public; the persons specially injured having nothing whatever to do in the matter except to appear as witnesses when called upon. This system has worked for three centuries with entire satisfaction.

PROSECUTOR (*ante*), in the United States is a public officer appointed by the general government or by that of each state to institute criminal proceedings against the violators of U. S. or state laws. It will be seen from this definition that the English system of prosecution by private individuals is not followed in this country, though in some states there may be private as well as public prosecution. The U. S. prosecutor is termed a district-attorney, and one is appointed by the president for each judicial district; in the state similar officers for each district or county are provided, usually by appointment from the legislature or the executive power, but sometimes by election. Prosecuting officers are also appointed for the police and minor courts, with less power than that of the district-attorneys, and special prosecuting agents are often provided to carry out laws regarding the licensing of liquor dealers. It is the duty of the public prosecutor in cases of small magnitude, or where the system of "informations" alone prevails, to present to the court a written accusation against the accused person, which must be under oath, and is called the information. In cases where a grand-jury indictment is necessary, he must frame the document and lay it before that body, with evidence in support of the allegations therein contained. He has the right to be present at the sessions of the grand jury, and to give their investigations all possible aid. When a "true bill" is returned by the jury the further conduct of the prosecution is altogether under his control. He may employ private counsel to assist him, or allow others to do so, but he remains the responsible instrument of the law. He may, if the evidence or facts within his knowledge justify in his judgment the step, enter a *nolle prosequi*, thus ending the present prosecution, but not barring the right to begin a new action on the obtaining of further proof. In some states the consent of the court must be obtained to the entering of a *nolle*, but it is usually within the discretion of the public prosecutor. The accused has a right to refuse the offer and demand a verdict, if a jury have been impaneled.

PROSELYTES (Gr. *pros-elytos*, one who comes from without, a stranger; Heb. *Gerim*) was the name given by the Jews to those heathens who became converts to Judaism. There were two kinds of proselytes distinguished: "proselytes of the gate," that is, heathen strangers, who, in order to be allowed to reside in Palestine, had undertaken to submit to the "seven commandments of the sons of Noah," that prohibit blasphemy, idolatry, murder, incest, theft, disobedience to the authorities, and the eating of flesh with the blood in it; commandments which probably had grown out of certain restrictions originally put upon the "strangers" by the Mosaic law (Exodus xii. 19; xx. 10, etc.). These "proselytes of the gate," "or sojourners," could not claim all the privileges of an Israelite, could not redeem their first-born, and, at a later period, were not allowed to live in Jerusalem; yet they were permitted to offer whole burnt-offerings, and otherwise contribute toward the religious wants of the commonwealth. The second class of proselytes was formed by the *gere hatsedek* (pious proselytes), or *gere haberith* (proselytes of the covenant). These accepted all the dogmas and customs of Judaism to their fullest extent, and were called "complete Israelites." The new candidates were first strictly asked for their motives, and the classification of those who were not to be admitted runs as follows: those whose motive is love (husband for the sake of following his wife's faith, or *vice versâ*); proselytes of the tables of the kings (i.e., those who covet court-favor); Esther-proselytes (who wish to escape some threatening danger, cf. Esther, viii. 7); and Lyon-proselytes (those who, from a superstitious fear, wish to enter Judaism, like the Samaritans, 2d Kings, xvii. 26). If, on the other hand, the motives were satisfactory, the candidate was further cautioned against attaching himself to a persecuted people, and warned that sufferings of all kinds would be his lot in this life. If all this did not deter him, he was "brought under the wings of God." He was fully instructed in the religion and history of the people, and shown the special providence that guided them and watched over them. If a male, he was circumcised, and, in case of his being circumcised already (for instance, if he belonged to another nation practicing this rite), a few drops of blood were drawn "from the blood of the covenant," a special prayer was said for him, and a new name was given to him, while for that of his father, Abraham was substituted. After the healing of the wound, baptism (tebilah) followed, and he had further to offer up a sacrifice (korban). Females had likewise to undergo baptism and to bring a sacrifice. All natural relations were then canceled, the proselyte was considered like "a new-born child," and the Holy Ghost was supposed to come upon him.

The desire to proselytize, which became strong among the political leaders during the Maccabean period, and which led to the "bringing into the congregation" of entire nations, such as the Idumæans under John Hyrkan, the Ituræans under Aristobulos, contrasted strongly and most characteristically with the utter contempt in which the new-comers were held by the people, and with the suspicion with which they were regarded, and their (after all) limited social rights and ambiguous position. The Talmud speaks of them in no measured terms, and there is no doubt that, on the whole, they must have acted a very dubious part. They were called the leprosy of Israel; it was the proselytes and other reprobates who stood in the way of the coming of the Messiah; and up to the twenty-fourth generation were they to be distrusted. Yet, notwithstanding all this, conversions were very frequent, especially among the better classes—and here, again, among women principally—in Damascus, Greece, Asia Minor, Rome; so much so, that even the Roman legislation was compelled, in the 1st c. B.C., to provide for cases of Judaizers. It is a curious fact, worth remembering, that one of the main features of the times of the Messiah was to be, according to Jewish tradition, the utter abolition of proselytism, and the entire ceasing of all distinctions of an opprobrious nature among men. The evil repute into which the term proselyte had fallen in the times of Christ also caused the early converts to Christianity to adopt the name of Neophytes (newly-planted) instead.

PROSERPINA, the Latin form of the Greek PERSEPHONE (also PERSEPHATTA, PERSEPHASSA, PHEREPHASSA; in Homer, PERSEPHONEIA), was, according to the common myth, the daughter of Zeus and Demeter (Ceres) or of Styx. The story of her abduction by "gloomy Dis," while gathering flowers on the plains of Enna, in Sicily, in company with Artemis and Athena, does not occur in Homer, who simply represents her as the wife of the king of Hades, and as the majestic queen of the under-world—a subterranean Hera (Juno). It is first given by Hesiod, and is manifestly an allegory of the seasons. See CERES. In the mystical Orphic hymns, Proserpina appears as the all-pervading goddess of nature, who produces and destroys everything, and she has been mixed up and identified with other mystical goddesses, Rhea, Artemis, Hecate, etc. She was generally worshiped under the name of *Kore*, "maiden," along with her mother

Demeter. The chief seats of her worship were Sicily and Magna Græcia; but she had also temples at Corinth, Megara, Thebes, and Sparta. In works of art, Proserpina is represented sometimes as the grave and earnest spouse of Pluto, sitting on a throne beside her somber husband, with a scepter and a little box; but more frequently as a blooming virgin, the picture of her mother, in the act of being carried off to Hades.

PROSODY (Gr. *prosōdia*, literally, "belonging to song or hymn") is the name given, both by the ancients and moderns, to that part of grammar which treats of the rules of rhythm in metrical composition. See METER, RHYME, BLANK VERSE.

PROSPECT, in Roman law, was recognized as a legal incident of a house, or an urban servitude, so that no adjoining owner was entitled to obstruct the prospect or view of a man's house. But if this meant more than that the light should not be sensibly obstructed, it is not recognized in English or Scotch law. See LIGHT.

PROSSNITZ, a manufacturing t. of Austria, in Moravia, in the fruitful plain of Hanna, stands on the Rumza, 12 m. s.w. of Olmütz. It has manufactories of woolen cloth, cashmeres, linen and cotton stuffs, distilleries, and breweries. Pop. 15,717.

PROSTATE GLAND, a pale, firm, glandular body situated in the lower part of the pelvic cavity, surrounding the neck of the bladder and the commencement of the male urethra. In shape and size it resembles a horse-chestnut, weighing about six drams, and is held in position by the anterior ligaments of the bladder, deep perineal fascia, and anterior portion of the levator ani muscle. It consists of three lobes, one middle and two lateral, and is inclosed in a thin but firm fibrous capsule, distinct from that of the posterior layer of deep perineal fascia, and separated from it by a plexus of veins. Its interior is of a pale, reddish-gray color, easily torn, but very dense, consisting of glandular substance and muscular tissue. The glandular substance is composed of numerous follicles opening into elongated canals, which join to form from 12 to 20 small excretory ducts which open into the urethra. The epithelium (q.v.) lining the canals is columnar, while in the follicles it is squamous. The muscular tissue (of the involuntary kind) is in the form of circular bands round the urethra, and is continuous behind with the circular fibers of the sphincter of the bladder, and in front with the circular fibers of the urethra. The prostate gland secretes a milky fluid having an acid reaction, and, when examined with the microscope, showing squamous and columnar epithelium and granular nuclei. In old age it is liable to become enlarged, and it is also sometimes the seat of various diseases. Inflammation of the organ is rarely ideopathic, but not infrequently occurs as the result of gonorrhea, or the use of instruments. Abscess may happen either as the result of acute inflammation, or it may occur with comparatively little antecedent inflammation, as sometimes happens in pyemia. Prostatitis is liable to produce retention of urine, either from inflammatory exudation, or from the pressure caused by the formation of pus. In such cases the urine must be drawn from the bladder by a catheter, an operation which, under the circumstances, requires considerable skill and knowledge in order to avoid injuring the gland. The enlargement spoken of above as occurring in elderly and aged persons, although liable to affect all classes, is more usual in those who have led irregular lives. The enlargement is due to hypertrophy of the normal structures, fibrous and glandular, of the organ, most commonly of the fibrous, but often of all the tissues. In rare cases there is excessive development of the glandular element, and sometimes tumors are developed. Sometimes the gland attains large dimensions. A preparation of one taken from a man eighty years old, in the Norwich hospital museum, England, weighs 30 ounces. The physical effects of enlarged prostate are often very distressing, but the moral effects are sometimes even worse, the constant irritation exciting libidinous ideas, leading to the perpetration of acts of indecency in those who have not firm moral control. It is not infrequently, however, the case that wrong ideas and wrong habits have preceded the prostatic disease and have been the cause of it. A state of atrophy sometimes occurs in the prostate gland as the result of exhausting disease; in some cases it may be congenital. The gland may also, very rarely, be the seat of cancer, as well as of tubercle, and of cystis, and prostatic calculi. Prostatic calculus generally occurs in old people, though it is sometimes met with in young subjects. Erichsen extracted two prostatic concretions from a lad of nineteen. These calculi are usually of a gray color, of a somewhat triangular form, hard, smooth, and polished, about the size of a cherry-stone or smaller, and have facets. Sometimes they attain the size of a hen's egg, when they are usually much branched and irregular.

PROSTITUTES, LAW AS TO. It is not an offense in this country for a person to carry on a course of prostitution in his or her own person; but when others are incited, or forced to that course, it may become so, in certain circumstances. Thus, for a person to keep a disorderly house, is an indictable offense, which is punishable by fine and imprisonment, and the parish officers in England are bound to institute the prosecution, the expenses of which are paid out of the poor-rates. It is, however, only the person who keeps the house who is punishable, and no punishment can be imposed on the frequenters of the house in any circumstances. The law may be said to be passive so far as the mere fact of prostitution or immoral intercourse is concerned, and gives neither party any remedy against the other, civil or criminal, arising out of that state of the relations between man and woman. Thus, if a man give a woman a bond, providing her an annuity in consideration of her living with him in concubinage, the law will not enforce it, because it is an immoral consideration. So, if a woman take lodgings, or buy dresses, for the purpose of carrying on a course of prostitution, the law will not enforce the payment of rent, or the price of the goods sold, because the tendency is immoral. In some countries, as in France, the law takes direct cognizance of the fact of prostitution, and deals with prostitutes for various sanitary purposes; but in this country the subject was entirely ignored, except indirectly in the cases above mentioned, and until 1864, when a statute was passed, which, to a certain extent, introduced the French procedure. The statute 27 and 28 Vict. c. 85, applied only to certain naval and military stations—viz., Portsmouth, Plymouth, Woolwich, Chatham, Sheerness, Aldershot, Colchester, Shorncliff, the Curragh, Cork, and Queenstown, but not to Scotland. In those places a justice of the peace may now, on information, order a womam to be taken to a certified hospital for medical examination; and if she is found to have a contagious disease, she may be detained in the hospital for medical treatment during not more than three months. A woman who refuses to submit to examination, or leaves the hospital without being duly discharged, is liable to be imprisoned for one or two months; and occupiers of houses alluring prostitutes to frequent their houses when having a contagious disease, incur a penalty of £10, or three months' imprisonment.

PROSTYLE. A temple with a portico in front. When it had a portico at both ends, it was termed amphi-prostyle.

PROTAG'ORAS, the Greek sophist, was a native of Abdera, where he was born of humble parentage, probably about 480 B.C. He was the first who took the name of "Sophist," or taught for pay. When he went to Athens is not precisely known; but he is conjectured to have gone thither about the middle of the century, and he seems to have enjoyed the friendship of Perikles. Accused of atheism by one of his own scholars he was banished from Athens, and his writings were ordered to be publicly burned. He died probably in 411 B.C. The basis of his speculation is the proposition that "man is the measure of all things," which was developed by him in a way that involved the most thorough-going skepticism. The *Theætetus and Protagoras* of Plato are devoted to a refutation of Protagoras's doctrines, which, as delineated by the great philosopher, appear shallow, confused, and untenable. All Protagoras's works are lost, though some were extant as late as the time of Porphyry.

PROTEA'CEÆ, a natural order of exogenous plants, containing about 650 known species of shrubs and small trees, chiefly natives of South Africa and of Australia, and forming a remarkable feature of the vegetation of these regions. Some of them, as species of *protea* and *banksia* (q.v.), are frequently cultivated in gardens and greenhouses, being prized for their singular and elegant appearance, and their curious and often beautiful flowers. They have usually umbellate branches; their leaves are evergreen, and remarkably hard, dry, and woody, divided or undivided, and without stipules. The perianth is four-leaved or four-cleft; the stamens, four, one of them sometimes sterile, perigynous, opposite to the segments of the perianth; the ovary superior, consisting of a single carpel; with one, two, or many ovules; the style simple, the stigma undivided; the fruit dry or succulent, and opening or not opening, many fruits often collected in a kind of cone. The timber of some of the larger species is used for various purposes; others supply much of the firewood of the cape of Good Hope and Australia. The nuts or seeds of some are eaten, as those of *brabejum stellatum* in South Africa, and of *guevina avellana* (also called *quadria heterophylla*) in Chili. Those of the latter are much esteemed, and are called *avellans* and *nebu*.

PROTECTION—PROTECTIVE DUTY, in political economy, terms applied to a practice, now in disuse in Britain, of discouraging, by heavy duties and otherwise, the importation of foreign goods, under the notion that such a practice increased the prosperity of the country at large. See FREE TRADE (*ante*); TARIFF.

PROTECTOR, a title which has sometimes been conferred in England on the person who had the care of the kingdom during the sovereign's minority. The earl of Pembroke was protector in 1216, in the minority of Henry III. Humphry, duke of Gloucester, held the same office in the minority of Henry VI., from 1422 to 1447. Richard, duke of Gloucester, was protector in 1483, prior to his ascending the throne as Richard III. The duke of Somerset, one of king Henry VIII.'s sixteen executors, was in 1548 constituted protector, during the minority of Edward VI., with the assistance of a council, consisting of the remaining fifteen executors; a dignity, however, which he enjoyed but a few months. Oliver Cromwell, in Dec., 1653, took the title of lord protector of the commonwealth of England, Scotland, and Ireland. In 1658 his son Richard succeeded to his title and authority, but was never formally installed in the protectorate, which he resigned in the following year.

PROTEIDS (PROTEINE and PROTEINE BODIES, *ante*). The proteine bodies may be included under the general name of *proteids*, and divided into the following classes:

CLASS I. *Native albumens*, occurring, as their name implies, in a natural state in animal tissues and fluids. They are soluble in water, and are not precipitated by very dilute acids, by carbonates of the alkalies, or by chloride of sodium. They are coagulated when heated to about 158° Fahr.

1. *Egg-albumen.*—This naturally exists in an aqueous solution, forming a transparent yellowish fluid. from which it may be precipitated by strong alcohol. If the alcohol is immediately and rapidly removed the precipitated albumen will readily redissolve in water. If the alcohol is allowed to remain, the precipitate forms a coagulum which is insoluble. Ether coagulates egg-albumen. Strong acids, especially nitric, produce coagulation like that by heat or the prolonged action of alcohol, and the coagulum does not redissolve on the removal of the acid. Nitrate of silver, acetate of lead, and corrosive sublimate, cause precipitation without coagulation, but the precipitate will redissolve if the precipitant is removed. Strong acetic acid in excess produces no precipitate; but if the solution is concentrated the albumen is transformed into a transparent jelly, and a similar result follows the addition of strong caustic potash, a profound change being effected in both cases. A solution of egg-albumen turns the plane of polarization of yellow light 35.5° to the left (— 35.5°). Strongly acidifying the solution with hydrochloric acid increases the left-handed polarization to — 37.7°.

2. *Serum-albumen* resembles egg-albumen, but is distinguished by the following characteristics: The rotatory power of serum-albumen is for yellow light—56°, and it is not coagulated by ether; nor is it very readily precipitated by strong hydrochloric acid; and whatever precipitate occurs is easily redissolved by the addition of more acid, the reverse of what takes place with egg-albumen. Precipitated or coagulated serum-albumen is soluble in strong nitric acid, which coagulates egg-albumen. Serum-albumen is found in blood serum, and also in lymph, both that which is contained in the lymphatic vessels and in the tissues, also in milk, chyle, and several pathological transudations, one of which may be mentioned, viz., the albumen which appears in urine in certain forms of renal disease.

Class II. *Derived albumens* (albuminates).

1. *Acid-albumen.*—If a solution of native albumen is acted on for a time with dilute hydrochloric acid (or some other) it becomes changed in properties; it is no longer coagulable by heat; when the solution is carefully neutralized the albumen is completely precipitated. The proteid in this case becomes converted into what is called *acid-albumen*, whose characteristics are insolubility in distilled water and in solutions of common salt and other neutral salines, but readily soluble in dilute acids as well as alkalies; and such solutions are not coagulable by boiling. If finely-chopped muscle, from which the soluble albumens have been removed, is treated for a considerable time with a .2 per cent solution of hydrochloric acid, most of the muscle becomes dissolved, the transparent solution containing a proteid which closely agrees in most characteristics with acid-albumen, and is called *syntonin* (q.v.).

2. *Alkali-albumen.*—If serum, or egg albumen, is treated with a dilute alkali, a change similar to that which occurred with treatment by acid takes place, and the albumen is no longer coagulable by heat, and precipitation follows neutralization. Indeed, the two preparations seem to be of the same nature, and one may be substituted for the other in subsequent experiments. The rotatory power of alkali-albumen varies according to its source. When it is prepared by strong caustic potash from serum-albumen, the rotation increases from — 56° (that of simple serum-albumen) to — 86°. When prepared from egg-albumen it is — 47° instead of — 35.5° (that of simple egg-albumen). If prepared from coagulated white of egg the plane of polarization will be turned — 58.8°. It is therefore supposed that there are several forms of alkali-albumen.

3. *Caseine.*—This proteid exists in milk. See CASEINE.

Class III. *Globulins.* See GLOBULINE, or GLOBULIN and GLOBULINS.

Class IV. *Fibrine* (q.v.).

Class V. *Coagulated proteids.*—Insoluble in water, dilute acids and alkalies, and in neutral saline solutions of all strengths; soluble only in strong acids and strong alkalies, except at high temperatures, when dilute preparations will effect a slight solution. The *coagulated proteids* are produced by heating to 158° Fahr. solutions of egg-albumen or serum-albumen, or acid or alkali-albumens, or fibrine suspended in water. At the temperature of the body they are converted by the action of the gastric juice, or of pancreatic juice in an alkaline medium, into peptones. This action takes place during the digestion of cooked meats.

Class VI. *Peptones.*—These remarkable organic compounds are very soluble in water, and are not precipitated from their aqueous solutions by acids or alkalies or by boiling. They are insoluble in alcohol, but are also with difficulty precipitated by it, and when precipitated are unchanged by the process. They are not precipitated by sulphate of copper, chloride of iron, nor (with some exceptions) by ferro-cyanide of potassium or acetic acid. In these respects they differ from most other proteids. Precipitation is, however, produced by chlorine, iodine, corrosive sublimate, nitrate of mercury, nitrate of silver, acetate of lead, and tannin. Like all proteids, the peptones have a specific left-hand rotatory power over polarized light; but unlike the others, boiling produces no change in the amount of rotation. Peptones are, doubtless, formed in large quantities in the stomach and intestines during digestion; but only a small quantity can be found in the digesting mass or in the chyle. Without attempting to settle the question as to where the final conversion of proteids into peptones takes place (perhaps upon the surface of the mucous membrane of the stomach, which is probable), it may be remarked that it is generally conceded that the peptones are absorbed very soon after they are formed. See DIGESTION.

PRO'TEINE AND THE PROTEINE BODIES. Under the term *proteine bodies*, chemists include the following substances: Albumen, fibrine, syntonine or muscle-fibrine, caseine, globuline, and hæmato-crystalline. Albumen, fibrine, and caseine are common both to the animal and vegetable kingdom; while the three others occur only in the animal kingdom (namely, in muscular tissue, in the crystalline lens of the eye, and in the blood-cells). The most careful analyses have shown that in their composition, these substances are almost identical, and that they all contain about 53.6 per cent of carbon, 7.1 of hydrogen, 15.6 of nitrogen, and 22.1 of oxygen, with a varying quantity of sulphur not exceeding 1.6 per cent. These substances are as similar in many of their properties, and in the products of their decomposition, as in their ultimate composition, and hence chemists were naturally led to entertain the view that they possessed a common radical. Mulder (q.v.) announced, in 1838, that he had discovered this radical, which, from its importance, he named PROTEINE (Gr. *proteuo*, I hold the first place), and that he had found that albumen, fibrine, caseine, etc. (which at that period were known as the *albuminous bodies*, the *albuminoid group*, or the *albuminates*), were combinations of this proteine with sulphur and phosphorus, or simply with sulphur. The composition of this proteine is represented, according to the discoverer, by the formula $C_{36}H_{25}N_4O_{10},2HO$. Liebig and several of his pupils have, however, shown that Mulder's proteine always contains a small but variable amount of sulphur; and they deny, on what are generally deemed sufficient grounds, the existence of proteine as a separate body. The term *proteine bodies*, or *proteine compounds*, is, however, commonly retained both by physiologists and chemists, as being the most convenient one for representing a class of compounds, which, whether Mulder's theory is correct or not, deserve their name from their constituting the group which form the most essential articles of food.

The PROTEINE BODIES may be generally described as nearly colorless, neutral, nitrogenous bodies, soluble in potash solution, and not yielding gelatine when boiled with water. They all present two modifications, differing essentially from one another; in one of which they are soluble, and in the other nearly or quite insoluble. They exist naturally only in the soluble modification, although not necessarily in a state of solution. Most of them are transformed into the insoluble state by boiling, by the mineral acids, and by numerous salts; and one of them, fibrine, undergoes this modification on simple removal of the blood, or other fluid containing it, from the organism. This passage from the soluble into the insoluble form, is temed *coagulation*, but we do not know what chemical change takes place in the process.

The *soluble proteine bodies*, in their dried state, form pale yellow, translucent masses, devoid of smell and taste, which are soluble in water, but insoluble in alcohol and ether. They are precipitated from their watery solutions by alcohol, by the mineral acids, by tannic acid, but not by the vegetable acids generally; and by many mineral oxides and salts. The *insoluble proteine bodies*, when freshly precipitated, are of a white color, in flakes or small clots, or viscid and glue-like: when dried, they may be reduced to a whitish powder.

The products of the decomposition of the proteine bodies are very numerous, and the study of those products is of great importance, as tending to elucidate the changes which the tissues undergo in the body during their disintegration.

PROTEL'IDÆ. See AARD-WOLF.

PROTESILA'US, a legendary king of Thessaly, brother of Alcimede, who was the mother of Jason. Protesilaus married Laodamia and soon after sailed with the other Greeks to the Trojan war. Homer portrays him as the first to set foot on the hostile shore and as the first man killed by the enemy. Laodamia committed suicide on hearing of her husband's death.

PRO'TEST is in law a legal document, drawn up by a notary-public, giving notice of some act of a public nature, as the protest of a bill of exchange.

PROTESTANT, a term first applied to the adherents of Luther, from their protesting against the decree passed by the Catholic states at the second diet of Speier in 1529. This decree had forbidden any further innovations in religion, and enjoined those states that had adopted the reformation so far to retrace their steps as to reintroduce the mass, and order their ministers to avoid disputed questions, and to use and explain the Scriptures only as they had hitherto been used and explained in the church. The essential principles involved in the protest, and in the arguments on which it was grounded, were: 1. That the Catholic church cannot be the judge of the reformed churches, which are no longer in communion with her. 2. That the authority of the Bible is supreme, and above that of councils and bishops. 3. That the Bible is not to be interpreted and used according to tradition or use and wont, but to be explained by means of itself—its own language and connection. As this doctrine, that the Bible, explained independently of all external tradition, is the sole authority in all matters of faith and discipline, is really the foundation stone of the reformation, the term Protestant was extended from those who signed the Speier protest, to all who embraced the fundamental principle involved in it: and thus Protestant churches became synonymous with reformed churches. The essence of Protestantism, therefore, does not consist in holding any special system of doctrines and discipline, but in the source from which, and the way in which it proposes to seek for the truth in all matters of faith and practice; and thus a church might, in the progress of research, see reason to depart from special points of its hitherto received creed, without thereby ceasing to be Protestant. The symbols or confessions of the Protestant churches were not intended as rules of faith for all time, but as expressions of what was then believed to be the sense of Scripture. When, at a later time, it was sought to erect them into unchangeable standards of true doctrine, this was a renunciation of the first principle of Protestantism, and a return to the Catholic principle; for, in making the sense put upon Scripture by the reformers the standard of truth, all further investigation of Scripture is arrested, the authority of the reformers is set above that of the Bible, and a new tradition of dogmas and interpretation is created, which differs from the Catholic tradition only in beginning with Luther and Calvin, instead of with the apostolic fathers. See REFORMATION.

PRO'TEUS, in the Homeric or oldest Greek mythology, appears as a prophetic "old man of the sea" (*halios gerōn*) who tends the seal-flocks of Poseidōn (Neptune), and has the gift of endless transformation. His favorite residence, according to Homer, is the island of Pharos, off the mouth of the Nile; but according to Virgil, the island of Carpathos (now *Skarpanto*), between Crete and Rhodes. Here he rises at midday from the floods, and sleeps in the shadow of the rocky shores, surrounded by the monsters of the deep. This was the time when those who wished to make him prophesy sought to catch him. But it was no easy task. Proteus, unlike most vaticinal personages, was very unwilling to prophesy, and tried to escape by adopting all manner of shapes and disguises. When he found his endeavors hopeless, he resumed his proper form, and then spoke out unerringly about the future.

PROTEUS, a genus of perrenibranchiate batrachia (q.v.), having a long, smooth, naked, eel-like body; four small and weak legs; the fore-feet three-toed—the hinder, four-toed; the tail compressed and forming a kind of fin; the head lengthened and flattened; the eyes extremely small, and covered by the skin; the ears concealed in the flesh; the gills external and permanent, reddish, very conspicuous, between the head and the fore-legs. Notwithstanding the permanent external gills, there are also lungs in the form of simple slender tubes, terminated by a vesicular dilatation. The only known species, *P. anguinus*, is found in subterranean lakes, in the great limestone caverns in Carniola. It seems to live chiefly in the mud which forms the bottom of the lakes or pools; but almost nothing is known of its habits. It is of a pale rose or flesh color, 10 or 12 in. long, seldom above half an inch in thickness. Specimens have been kept alive in confinement for several years, in a darkened aquarium, apparently without food. One which ate a worm died soon after. The blood-corpuscles of the proteus are extremely large.

PROTEUS, a name given by many naturalists to certain animalcules remarkable for changefulness of form; on which account also, as the name proteus has been otherwise appropriated in science, they now receive the generic name *amœba* (Gr. vicissitude). They are *protozoa*, and ranked among the *rhizopoda*. See these heads. They are found in fresh water, and are generally from $\frac{1}{800}$ to $\frac{1}{500}$ of an inch in diameter, when they assume a somewhat globose form, which, however, they exchange for almost every imaginable shape, so that they cannot be described as having any proper or definite shape whatever. They consist of a transparent gelatinous substance (*sarcode*), or protoplasmic matter, which is divisible into two layers, an outer (*ectosarc*) and an inner (*endosarc*). The ectosarc is highly contractile, and can be protruded into blunt finger-like processes called *pseudo-podia* (false-feet), by which the animal is enabled to move along, and by which it procures its food, such as adiatom, which it draws into its substance, there being no mouth; and the effete matters are ejected from any part of its circumference. These pseudo-podia can be protruded from any part of the surface, and can be again retracted at the will of the animal. The only organs present in these animals is the *nucleus*, a dark, solid, refractive body, whose function is unknown; the *contractile vesicles*, which are spaces filled with fluid, and pulsate rhythmically; and other spaces called *food vacuoles*.

Reproduction takes place either by fission, or a single pseudo-podia separates and becomes a fresh amœba; or by the separation of a little mass of sarcode from the interior, the animal having become quiescent, and the nucleus and contractile vesicles disappearing. These little masses develop themselves into ordinary amœba.

PROTOCOCCUS (Gr. first-grain, a genus of *palmellaceæ* (q.v.), to which red snow (q.v.) is commonly referred.—Another species is *P. pluvialis*, not unfrequent in stagnating rain-water. It passes through various stages of growth, in which it has been described under various generic and specific names. In some of its stages, in which it moves by means of two long cilia, it has often been mistaken for an animalcule. Its color is usually green, but sometimes red; and the red matter often appears as a mere central nucleus, which has been mistaken for the *eye* of the animalcule. In its ordinary form it consists of a mass of colorless *protoplasm* (see CELLS), with red or green granules diffused in it, surrounded by a *primordial utricle* (see CELLS), and undergoing division into halves, which are soon surrounded by separate envelopes, and undergo division again; the new cells thus formed, and they are formed with great rapidity, being sometimes set free by the dissolution of the original enveloping membrane, more frequently remaining imbedded in a gelatinous substance formed from it. The new cells often send forth two vibratile filaments or cilia, which spring almost from one point, often a kind of beak; and move with considerable rapidity; and in this state also, they multiply by binary subdivision; or they rest, become *encysted*, and divide into four. If slowly dried, the *P. pluvialis* retains life, and resumes its functions when again moistened.

PRO'TOCOL (Gr. *prōtos*, first, and *kolla*, glue), a word used in two senses: 1. The rough draft of an instrument or transaction; and more particularly the original copy of a government dispatch, treaty, or other document. 2. A record or register. In Scotland every notary, on admission to office, formerly received from the clerk-register a book called his protocol, in which he was directed to insert copies of all the instruments which he might have occasion to execute, to be preserved as in a record. At one time these protocols were attempted to be made available as records of sasines, but many causes operated to prevent their being thus used; they have, however, often been found serviceable, when regularly kept, to supply the loss of a missing deed.

PRO'TOGENE (Gr. first-born), a granitic rock, composed of the same ingredients as true granite, except that the mica is replaced by talc. It received its name because it was supposed to have been the *first-formed* granite. It abounds in the Alps, and is found also in Cornwall. The clay produced by its decomposition is greatly valued for the manufacture of china.

PROTOG'ENES, a celebrated painter of ancient Greece, was b. at Kaunus, in Caria, and practiced his art at Rhodes. Very little is known concerning him, except that he was a contemporary of Apelles, who was the means (see Apelles) of first drawing the attention of the Rhodians to his extraordinary merits. Pliny says that when Demetrios Poliorketes was endeavoring to conquer Rhodes, he took the utmost precautions to prevent any injury from happening to the studio of Protogenes, who then lived in a little cottage (*casula*) on the outskirts of the city, and even stole away at times from the turmoils of the siege to visit the painter, quietly and earnestly pursuing his work amid "the din of arms and the thunder of the battering-engines." Protogenes died about 300 B.C. He was a careful and elaborate painter, sparing no pains to secure a brilliant, natural, and finished piece of workmanship; and was apparently held in the highest estimation by the ancients. Cicero says that his pictures were perfect in every respect. The principal were: "A Satyr resting and holding his pipes;" "The *Paralos* and *Ammonias*" (or sacred ships of the Athenians, executed for the Propylæa at Athens); and "The Thesmothetæ" (for the Athenian senate-house of the five hundred).

PROTOHIP'PUS. See Horse Fossil.

PROTONOPSIS. See Menopome, *ante*.

PROTO-NOTARY (Gr. *prōtos* first, and Lat. *notarius*, notary), the name given to a notary appointed by the holy see. Among the officials of the court of Rome is a body, twelve in number, called the college of notaries, who are to be distinguished from honorary or extraordinary apostolic notaries. The former are said to date from a very early time, and are charged with the official registration of all the solemn acts of the pope, whence they have a very special duty in relation to canonizations of saints, etc. Their number was fixed by Sixtus V. at twelve, and they enjoy many privileges. An apostolic notary-extraordinary, although called proto-notary, does not enjoy the same privileges. The proto-notary extraordinary may be named not only by the pope, but also by a legate (q.v.), and under certain restrictions, by the Roman college of notaries.

PRO'TOPHYTES (*Protophyta*, Gr. first plants), a name now frequently employed to designate the lowest or simplest organisms in the vegetable kingdom, corresponding to the *protozoa* of the animal kingdom. They are regarded as among the *algæ* (q.v.). Many of them are mere simple cells, which multiply by division, although perhaps they may yet be found to have also another mode of reproduction; others consist of cells united by a gelatinous substance, and the aggregate in some is a shapeless mass; in others, a plant-like structure, the form resulting from the mode in which the division of cells takes place. In none of them do the cells assume determinate characters in any part of the structure, so as to constitute different organs; in which they differ from all higher plants. It is sometimes very difficult to distinguish protophytes from *protozoa;* and perhaps the surest distinctive character is the nature of their food. Some of the *protozoa*, having no mouth, as the *proteus* or *amœba*, might be regarded as plants rather than animals; but they subsist by consuming organic particles, vegetable or animal, whilst protophytes live by appropriating inorganic substances, chiefly from the air or water around them. Among the protophytes are *palmellaceæ* (q.v.).

PRO'TOPLASM. See Cells.

PROTOZO'A (Gr. *proton*, first, and *zoōn*, animal), constitute the lowest animal subkingdom, and include a large number of animal beings of the lowest and simplest type of organization. Their bodies consist either of a simple cell or of an aggregation of cells, each of which seems to retain its independent existence. In none of the protozoa can a nervous system, or organs of sense, be detected; and except in one group (the *infusoria*) there is no trace of a mouth. Excepting the sponges, they are generally of very minute size, and only to be observed with the microscope; and excepting a few that inhabit the bodies of other animals, all are aquatic animals. They generally present the appearance of a transparent gelatinous cell, containing a nucleus; in addition to which, one or more clear pulsating spaces, termed *contractile vesicles*, may be frequently seen. Excepting the infusoria, none present true reproductive organs, reproduction being usually accomplished by fission. They are divisible into the following groups or classes, each of which is noticed in a separate article: (1) *gregarinidæ*, (2) *rhizopoda*, (3) *spongiæ*, and (4) *infusoria;* to which Green, in his *Manual of Protozoa*, adds *polycystina* and *thalassicollidæ* (both of which are commonly included in the rhizopoda).

PROUD FLESH is the popular term for coarse and too luxuriant granulations (q.v.) springing up on wounds or ulcerated surfaces. Such granulations must be treated with nitrate of silver or sulphate of copper, either in the solid form or in strong solution.

PROUDHON, Pierre Joseph, a noted French publicist and speculator on social and political subjects, was b. July 15, 1809, at Besançon, in which town his father was a poor cooper. Through the good offices of charitable friends, he received the rudiments of his education at the college of his native place, and from the first gave great promise of talent; while still very young, however, he quitted the institution in order to aid his family, which had fallen into great distress, and sought employment in a printing establishment. Here he was noted for the most punctual discharge of duty; and in the hours not occupied in work, he contrived, by a rare exercise of resolution, to complete and extend his education. In 1830 he declined an offer of the editorship of a ministerial journal, preferring an honorable independence as a workman, to the career of a writer pledged to the support of authority. He became partner in 1837 with MM. Lambert and Maurice in the development of a new typographical process; was engaged on an edition of the Bible, to which he contributed notes on the principles of the Hebrew language; and in 1838 published an *Essai de Grammaire Générale;* in approval of which, a triennial pension of 1500 francs was awarded to him by the académie de Besançon. On this accession of funds, he paid a visit to Paris; and subsequently contributed to the *Encyclopédie Catholique* of M. Parent Desbarres the articles Apostasie, Apocalypse, and others. In 1840 he issued the work entitled *Qu'est-ce que la Propriété?* which afterward became so famous. The nature of the doctrine announced in it is sufficiently indicated in its bold paradox, soon to be widely popularized—*La Propriété, c'est le Vol.* At the moment it attracted little notice; and the sole results to its author were the withdrawal of his pension by the academy, on the score of his noxious opinions, and the threat of a prosecution, which, however, was departed from at the instance of M. Blanqui, the political economist, to whom reference in the matter was made. In 1842, for a repetition of offense in his *Avertissement aux Propriétaires*, he actually *was* prosecuted before the Cour d'Assises of Besançon, but succeeded in obtaining an acquittal. From 1843 to 1847 Proudhon was employed at Lyons, under MM. Gauthier, in the superintendence of a scheme of water-transport on the rivers Saône and Rhône; publishing during this time at Paris the two works entitled *De la Création de l'Ordre dans l'Humanité*, and *Système des Contradictions Economiques.*

With the outburst of the revolution of Feb., 1848, the opportunity of Proudhon had arrived. He instantly repaired to Paris, and on April 1st he came before the public as editor of the *Représentat du Peuple*, instantly, by his fierce and vigorous advocacy of extreme democratic and socialistic opinions, making his mark as a leading figure of the hour. His paper was suppressed in August following; but meantime, on June 4, no less than 77,094 enthusiastic admirers had voted him into the constituent assembly as representative of the department of the Seine. His career as a senator, if brief, brought him at least notoriety. *La Propriété, c'est le Vol*, though a maxim much commending itself to the moral sense of the hungry masses, naturally failed to find like acceptance with an audience mostly with some sous in the pocket. Proudhon soon ceased to address the assembly, for, so soon as he ascended the tribune, the indignant roar which saluted him rendered audible speech impossible. Under these circumstances Proudhon once more betook himself to his pen, and, as editor of three daily journals in succession, avenged himself on the adversaries who declined *vivâ voce* to listen to him, the chief victims of his savage personalities being MM. Ledru-Rollin, de Lamartine, Louis Blanc, Considerant, Cavaignac, etc. All three papers—*Le Peuple* (Nov. 23, 1848—April, 1849), *La Voix du Peuple* (Oct., 1849—May, 1850), *Le Peuple de* 1850 (June 15—Oct. 13)—were in turn suppressed as anarchic and obnoxious. During their continuance he was repeatedly subjected to fines, which were defrayed for him by popular subscription.

In Jan., 1849, he attempted a reduction of his theories to practice by the institution of a *banque du peuple.* This project, which had for its object *la suppression du capital*, speedily experienced at the hands of "capital" the fate it had intended to inflict. The bank was closed by authority, and its originator fled to Geneva, to escape threatened imprisonment. In June, however, he returned, and his next three years were passed in the prison of St. Pelagie. While shut up there, he married. During his imprisonment he gave to the world the works entitled *Confessions d'un Révolutionaire* (1849), *Actes de la Révolution* (1849), *Gratuité du Credit* (1850), and *La Révolution Sociale démontrée par la Coup d'État* (1852); the last of which is remarkable, in the light of subsequent events, for the clearness with which he states the alternative of *l'anarchie ou le Césarisme*, as pressed on Louis Napoleon, then president. In June, 1852, he was set at liberty; and quitting Paris, no longer a desirable abode for such unquiet spirits, went to Belgium, where he continued to publish from time to time on his favorite subjects of speculation. He died in obscurity at Paris, Jan. 19, 1865.

Monstrous as are the social theories with which, in the history of his time, the name of Proudhon remains connected, his power as a writer is not to be denied. It may be questioned how far he was at any time the dupe of his own paradoxes, or blind to the utter insufficiency of the premises from which, with a show of scientific rigor, he evolved his portentous results. It is related that in the negotiation of his marriage, he was very sharply solicitous as to the disposal of certain property possessed by the lady; and that on her notary venturing some surprised allusion to the famous *La Propriété c'est le Vol*, the philosopher gravely replied, "Be pleased, my dear sir, on such an occasion as the present, to be, if possible, a little serious."

PROUT, **Father.** See **Mahony, Francis.**

PROUT, **Samuel**, painter in water-colors, was b. at Plymouth in 1783. He evinced a strong love for nature at an early age. Mr. Britton, when about to collect materials for his *Beauties of England and Wales*, engaged his professional aid; and his drawings made for Britton's work attracted so much notice in London that he was induced to take up his residence in that city. In 1818, having been advised, on account of his health, which had always been delicate, to try a change of air, he went to Rouen by Havre; and the picturesque street-architecture and fine Gothic remains there made so strong an impression on his mind, that afterward, his principal works were those in which architecture had a prominent place; and from time to time, in his after-career, he made excursions, ransacking every corner of France, Germany, the Netherlands, and Italy, for picturesque architectural remains. Prout's name is dear to all the artists and amateurs of this generation, for there are few who have not been incited or instructed by his numerous elementary drawing-books, in the slightest of which talent and feeling for art are conspicuous. His water-color drawings are characterized by decision in handling, great breadth, and clear and pleasing coloring; good specimens are highly valued. He died at Camberwell Feb. 9, 1852. His character was amiable, and he was highly respected by his professional brethren.

PROVENÇAL LANGUAGE **and** LITERATURE. See **Romanic Language**; **Troubadour**, *ante*.

PROVENCE, formerly a maritime province of France, in the extreme s.e. of the country, was bounded on the s. by the Mediterranean, and comprised the modern departments of Bouches du Rhone, Var, Basses-Alpes and the e. part of Vaucluse. It included a portion of the territory belonging to the Roman province of Gaul generally called *Provincia* ("the Province"), whence it derived its name.

PROVERBS (Lat. *proverbium*, a common saying or word, Gr. *paroimion*, a wayside saying, corresponding to Eng. byword) are pithy, practical, popular sayings, expressive of certain more or less general convictions. The definitions of the proverb are almost as numerous as its own varieties of form. Aristotle speaks of them as "remnants, which, on account of their shortness and correctness, have been saved out of the wreck and ruins of ancient philosophy." Agricola considers them "short sentences, into which, as in rules, the ancients have compressed life." Erasmus holds them to be "well-known and well-used dicta, framed in a somewhat out-of-the-way form of fashion." Cervantes explains them as "short sentences drawn from long experience." Johnson talks of them as "short sentences frequently repeated by the people." Less definitions of than general opinions on the proverbs, are sayings like that of Howell, that "sense, shortness, and salt" form their component parts. They are "the genius, wit, and spirit of a nation," according to Bacon. "The wisdom of many, and the wit of one," according to earl Russell. In them, it has been said, is to be found an inexhaustible source of precious documents in regard to the interior history, the manners, the opinions, the beliefs, the customs of the people; and their use has been strikingly pointed out by George Herbert, who entitled his collection of proverbs *Jacula Prudentium* (Darts or Javelins of the Wise), a term probably derived from Plato's *Protagoras*.

Yet there have, on the other hand, not been wanting those who, like lord Chesterfield, have deprecated their use in polite society, on account of their occasional vulgarity, and recommended stilted sentences à la Rochefoucauld instead. Of these solitary voices, however, no more notice was ever taken than they deserve. From the earliest historical times, proverbs have been household words, not merely among the people at large, but among the greatest and wisest of men. The prodigious amount of sound wisdom and good common sense they contain, the spirit of justice and kindliness they breathe, their prudential rules for every stage and rank, their poetry, bold imagery, and passion, their wit and satire, and a thousand other qualities, have, by universal consent, made them the most favorite mode of imparting hints, counsels, and warnings.

Being emphatically sayings originated within or commonly adopted by the people, and handed down, in most cases, from the remotest antiquity, the question as to their origin and age is an exceedingly difficult one. Some of their sources have been pointed out in the responses of oracles, in the allegorical symbols of Pythagoras, in the verses of the ancient poets, in mythological tales, in historical events to which they allude. That they existed to a great extent before the times of which written records have reached us, is clear from the number of them which lie imbedded—as a kind of well-known quotations—in these records themselves; and what tends still further to increase the difficulty of giving them a kind of fixed habitation within a certain country or age, is the circumstance that the same proverbs are found, as it were, among all nations and at all ages. From the east they were for the most part imported into Hellas, thence to Rome, and from thence they were scattered all over Europe, and partly brought back again, slightly altered to the east. Even certain Jewish proverbs quoted by Christ and the apostles, which hitherto did not seem to offer any analogy in other languages, might be traced back to India, where they had existed for many long centuries before they found their way into the popular speech of Palestine and Babylonia, and thence into the Talmud. That the names of their authors should, as a rule, be lost, is not surprising; yet we do meet with single instances in which either the author of a proverb is well known, or others whose nationality and birthplace are easily recognized. In the former case, it is generally some memorable event in a celebrated man's life which is remembered in close connection with a certain striking sentence he then uttered. In the latter, the scenery, the circumstances, the history of a special country, may so unmistakably be pointed, that they leave no room for any doubts on the birthplace of the special proverb; and more than that, even the special period which gave it birth may be recognized by some trace of its character, manners, fashions, and occupations. "What is nearest and dearest to the heart of a nation, the aspect under which they contemplate life, how honor and dishonor are distributed among them, what is of good or of evil report in their eyes," as a recent writer has it, will surely be apparent in their national proverbs. Thus, for instance, the Greek proverbs may be designated as being fraught with a thorough knowledge of their own mythology, poetry, and history, bearing testimony to the high intellectual training that ran through all classes. The Roman ones—fewer in number, as far as they are the genuine growth of their own soil—have much less poetry about them, and are also deficient in the refinement and delicacy which were indigenous to Hellas. On the other hand, the character of the people comes well out in the constantly reiterated lessons of frugality, patience, perseverance, independence they inculcate; the practical hints as to marriage, education; and the various pursuits of that busy, vigorous, energetic nation—and among which agriculture played a prominent part. Of the proverbs now in use among European nations—calculated at about 20,000—the Spaniards are supposed to have a very large, if not the largest proportion. They may be recognized by a certain *grandezza*, a stateliness and thoughtfulness, blended though they be with humor and irony; and by the spirit of chivalry, honor, and freedom with which they are filled. The Italian proverbs, which come next as to quantity, are, to a certain extent, replete with a certain shrewdness and selfishness; and while they are fraught with unbridled passion, teach doctrines of cynicism and general distrust; yet, on the other hand, there are many of the noblest stamp, of a delicate refinement of beauty, of a subtle wisdom, teaching honor and honesty, plain-dealing and uprightness. In the same way, the French, the German, the English, as well as the Chinese and the Hindus, and every nation under the sun, impart a certain distinctive type and stamp to their homely sayings, which tells a distinct tale respecting their own inner life and national peculiarities. Of the Scotch proverbs, of which Kelly collected 3,000, it has been said that there is a shrewdness, although deficient in delicacy, about them; that they are "idiomatic, facetious, and strike home."

Of the general utility of the proverb it is needless to speak, after what we have said; we will only adduce the well-known frequent use made of them for ethical purposes in Scripture, which contains an entire book of them, ascribed, for the greater part, to the wise king himself; in the Midrash and Talmud, which contains, likewise, a whole collection of pithy sayings of the "fathers," or Mishnan teachers, and out of which several later collections have been compiled: in the patristic and later theological writers, who, like Luther, drew very largely upon these popular treasures.

Erasmus lays claim to be the first modern collector of proverbs, although Polydore Vergil, and not without a certain amount of truth, accuses him of plagiarism. His *Adagia* (Par. 1500) fired the learned in Europe with a desire to collect and to publish proverbs of their own countries. F. Nunez and the marquis of Santellana edited Spanish *Refranos;* Florio, an Italian, *Giardino di Ricreatione* (1591); which was followed by the Italian collections of Angelus Monozini and Julius Varini. Ondin published French proverbs as *Curiosités Françoises.* The first real German (Nether-Saxon) collection is due to Johann Agricola, whose *Gemeine Sprikwoerde* appeared in 1528. In England, Camden, Herbert, Howell, Fuller, Ray, Kelly, Bohn, and others; in Germany, Weber, Sailer, Nopitzsch, etc., have issued national collections. Freytag and Burkhardt published *Arabic Proverbs;* Dukes, a small collection of Neo-Hebrew proverbs, etc. Thus, it may easily be seen, there is by no means a lack of material; and yet very little has been done toward the investigation and elucidation of the numerous points of interest connected with this subject. Disraeli's *Curiosities of Literature* contains a valuable essay on the "Philosophy of Proverbs," from which (as also from Eiselein's *Sprichwörter und Sinnreden*, 1840) archbishop Trench has derived a great deal of information for his excellent little book, *On the Lessons in Proverbs.* Freytag's introduction to his collection of *Arabic Proverbs*, and that of Le Roux de Lincy to his French collection, make honorable exceptions to the general run of vapid prefaces to most modern collections.

PROVERBS, THE BOOK OF (Heb. *Mishle*, LXX. *Paroimia Salomontos*, Vulg. *Proverbia*), a canonical book of the Old Testament, containing an anthology of gnomes and sentences, the fruit of reflections on the Mosaic law and on the divine guidance of the people of the Israelites. It is also called the "Book of Wisdom," inasmuch as it embraces the doctrines of the old covenant crystallized into religious maxims of thought, will, and action. Practical piety is enjoined under the name of "life," while "death" represents sin throughout. The form of these proverbs is manifold—similes, enigmas, theses and antitheses, wise sayings, gnomes, comparisons, etc., vary constantly. The book is divided into three sections, to which the two last chapters form an appendix. The first section (chaps. i.–ix.) contains a description and a recommendation of wisdom as the highest good obtainable, and is further subdivided into three portions. The second (x.–xxiv. 34) is equally in three portions, in the first of which the sentences are very loosely strung together; while, in the second, they are joined into more continuous utterances, sometimes running through several verses; and the third, which has the inscription: "These, too, are of the wise men," contains, again, some single sentences, principally in the form of commandments and prohibitions. The third section (xxv.–xxix.) is inscribed: "These are also proverbs of Solomon, which the men of Hezekiah king of Judah copied out," and is somewhat different from the former by the more predominant form of theses and antitheses, catch-words by which an association of ideas is produced, and similes. The first chapter appended (xxx.) contains the proverbs of Agur, which, in a very artificial garb, teach the true wisdom and its practice in life; the second (xxxi.), inscribed: "Words of king Lemuel, the prophecy that his mother taught him," contains from verses 1–9 wise maxims for a king anent chastity and temperance, and from 10–31, the praise and properties of a good wife, in the form of an alphabetical song. Tradition has ascribed the authorship of this book to Solomon, "the wisest of men:" but although neither the language, nor the structure, nor—as has principally been urged—the contents, are of a nature to convince us of the absolute necessity of assuming various authors and various epochs, there is no doubt a strong presumption in favor of this hypothesis. Who the Agur was that is mentioned as the author of the last chapter but one, is not easily conjectured. Equally unsatisfactory are the results of the speculations about the reputed author of the last chapter, Lemuel, by some supposed to be the brother of Agur. Probably it is nothing more than a symbolic name. The last section (xxxi. 10–31)—an alphabetical acrostic—probably belongs to the 7th c. B.C., and by its language and form, does not appear to belong to the author of the preceding part of the chapter. The nucleus of the book is formed by the second section (x.–xxii. 16), to which the first (i.–ix.) was added by way of introduction, and the third as the concluding portion. Whether that first anthology (from the 3,000 proverbs of Solomon mentioned 1 Kings iv. 32) was collected and redacted (into section two) during Solomon's lifetime, is very doubtful; so much, however, is certain, that the learned men at the time of Hezekiah undertook their additional collection with a view to a then already existing portion. It may not be superfluous to add, that Jerome, misled by 1 Kings iv. 32, erroneously states our book of proverbs to contain the 3,000 proverbs there ascribed to Solomon. The canonicity of the book is matter of controversy in the Talmud; there seems to have been at one time an objection to receive it among the number of sacred books, on account of certain contradictions contained in it; this objection, however, was overruled, and it occurs in the order of the Hagiographa (Kethubim) of the Masoretic code, generally between Job and Ecclesiastes. The order followed in the authorized version had been adopted already in the time of Jerome.—Principal writers on Proverbs are Ewald, Bertheau, Hitzig, Elster, Rosenmüller, Hirzel, Umbreit, M. Stuart, and Dr. Noyes.

PROVIDENCE, in theology, is God's wise and powerful preservation and government of his creatures and works. By preservation is meant that all creatures and things, with their powers and properties, are continued in existence by the will and power of God. Some regard this as a continual creation; which others deny, since, as they affirm, calling into existence is a different thing from continuing in existence; in the former there can be no co-operation with second causes; but in the latter God's power acts in connection with them. The question is one of metaphysics. The government of the universe includes the great end which God designs to attain, and the means and processes by which it is to be accomplished. These imply an intelligent control over all physical forces, intellectual powers, and moral agencies. 1. The fact of providence may be inferred from the fact of creation. The supposition that God would create this vast universe, and leave it without care, either for its preservation or its accomplishment of the design for which he created it, is absurdly contrary to the divine wisdom which creation itself displays. There must be a providence proportioned to creation, and as the whole universe has been created, providence must extend over it all. 2. Providence is actually exhibited through the universe, in the preservation of it, through long periods of time. The design to preserve it and processes by which it is preserved are manifested through it all. The continual exercise of government is likewise exhibited over its physical, mental, and moral forces. 3. The religious nature of man instinctively believes in a universal providence. It recognizes human dependence on God and responsibility to him. It believes in his moral government as exercised in this world. It believes in intercourse with him. It is naturally prompted to call on him in trouble, danger, and want. It fears the exercise of his justice towards transgressors; it feels its need of his mercy. All this would be a delusion, imposed on the nature of man by its creator, if there were no universal providence corresponding to it. Some indeed attribute the existence of all religious convictions to education. The answer to them is, that the sense of dependence, responsibility, and obligation, and of divine government over men, is too general to be accounted for by education. Who are the educators? it may be asked; and who educated them? 4. The Scriptures affirm the providence of God; declaring that he upholds all things by the word of his power; that in him men live, move, and have their being; that his government is universal, extending over all creatures and all their actions; that it is all-powerful, rendering certain the accomplishment of all his plans; that it is infinitely wise in the ends which it proposes, in the means which it employs, and the control which it exercises over creatures and things; and that it is holy, doing, requiring, and ultimately allowing, nothing inconsistent with justice, truth, and love. Some professing to believe in a general supervision and government over the universe deny that it extends to particular persons and things. To this it has been answered that there can be no general providence which is not also particular. The general is made up of the particulars. Care over the one includes care over the others. Some say that care over minute and insignificant things is beneath the greatness of God. To this the answers are: (1) If to create the little was not beneath God, to take care of it cannot be; (2) the greatest things are made up of things indefinitely small; (3) the qualities of things are lodged in the elementary particles, that are immeasurably little. Some deny that the providence of God can deal favorably in any wise with the unworthy and guilty. But in reply it is urged, that guilt increases the need that men should be cared for; transgressors cannot be neglected under a moral government; that God's goodness is displayed towards the evil as well as the good; and that his grace to sinners is manifested as the crowning wonder of his providential government.

PROVIDENCE, a co. in n. Rhode Island, adjoining Connecticut and Massachusetts; drained by the Blackstone and Pawtuxet rivers, intersected by the railroads centering in the city of Providence (q.v.); 400 sq.m.; pop. '80, 197,874—139,079 of American birth. The surface is uneven and well wooded. The soil is moderately fertile. The principal productions are hay, corn, and potatoes. Manufacturing of jewelry, machinery, cotton and woolen goods, and other articles is extensively carried on. Co. seat, Providence.

PROVIDENCE, a city, semi-capital, and seaport of the state of Rhode Island, U. S., situated at the head of navigation, on an arm of Narragansett bay, known as Providence river, 35 m. from the ocean, 43 m. s.s.w. from Boston, and 160 n.e. of New York. It is the second city in New England, covering nearly 15 sq.m. on both sides of the river, which, above its two bridges, expands into a cove, a mile in circuit, on the borders of which is a handsome park, shaded with elms. It is a city of large commerce, manufactures, and wealth, abounding with beautiful villas and gardens. Two small rivers afford water-power to extensive manufacturing establishments. There are 10 daily and other papers, the oldest of which was established in 1762; 76 churches, among them the oldest Baptist church in America, established in 1638 by Roger Williams; hospitals and asylums; a state prison, which had, in 1874, 67 convicts, making cabinet-work and shoes, and earning $3.000 a year over their expenses. Among its institutions are: Brown university; an athenæum, with a library of 34,000 volumes; a liberally endowed college of the society of Friends; a Roman Catholic institute; Franklin lyceum; 4 grades of free schools; 45 banks; 20 insurance companies; 10 railways, all but two uniting in one central station; several lines of steamboats; 50 cotton factories, 25 woolen; numerous iron-works; several bleaching and calendering mills; 5 large screw-mills, making 5,000 tons a year; and 150 manufactories of gold and silver ware and jewelry. Providence was settled in 1636 by a colony of refugees from Massachusetts under Roger Williams. Pop. '75, 100,675.

PROVIDENCE (*ante*), is the principal port of entry and one of the capitals of Rhode Island, and the shire town of Providence county. It was incorporated as a town in 1649, and as a city in 1832. During the 140 years after its settlement the town increased slowly, and in 1776 the population was only 4,355; but after the close of the revolution it began to increase steadily. By the last census, 1880, its population was 104,852. The city is a place of much wealth, the center of a large manufacturing district, and has an extensive trade, especially in cloths, chemicals, dyestuffs, coal, etc. Its manufactures include cotton and woolen goods, iron, gold, and silver wares, and numerous other articles. During 1875 the value of the products of woolen manufactures was $4,291,573; of the cotton manufactures, $1,874,300; of calico prints, $3,850,828; and of iron manufactures, $8,488,402. The manufacture of jewelry, however, is the most extensive industry in the city, the annual product being about $5,000,000. The iron manufactures include steam engines and boilers, butt-hinges, screws, locomotives, muskets, iron castings, and others of less importance. There are also several bleaching and calendering establishments, and manufactories of alarm tills, toilet and laundry soaps, ribbons, etc. The commerce of the city is confined chiefly to the coasting trade. For the year ending in June, 1875, the exports amounted to $23,086 and the imports to $566,459. Some of the receipts by vessels and railroad were: cotton, 249,897 bales; flour, 345,440 barrels; grain, 2,107,000 bushels; and coal, 691,847 tons. Of the railroads which connect the city with the principal points in New England, the most important are the Boston and Providence, the Hartford, Providence, and Fishkill, the Providence and Springfield, the Providence and Stonington, the Providence and Worcester, and the Fall River, Warren, and Providence. Steamboat lines connect the city with New York, Philadelphia, Baltimore, Norfolk, and Charleston.

The charitable institutions are numerous and well supported, and the incorporated educational institutions, as well as the public schools, have a high character. In 1874 there were 76 public schools, having 325 teachers, and a regular attendance of 12,439 pupils. The city is the seat of Brown university (q.v.) The religious organizations include 13 Baptist, 2 Christian, 7 Congregational, 12 Episcopal, 1 Evangelical Lutheran, 5 Free Baptist, 1 Friends, 2 Jewish, 10 Methodist Episcopal, 1 Presbyterian, 10 Roman Catholic, 3 Unitarian, and 2 Universalist.

The city is divided into 10 wards, and its government is vested in a mayor, with one alderman and 4 councilmen from each ward. The valuation of real estate in 1874 was $81,040,300; personal estate, $42,642,500; rate of tax, $14.50 per $1000; amount of tax, $1,793,400. The city's expenditures during 1874 were $7,505,590, of which $6,158,354 were classed as extraordinary, leaving a balance in the treasury of $462,643. At that time the funded debt amounted to $5,400,000, and the floating debt, $2,043,800.

PROVINCE, Ecclesiastical. After the state had become Christian under Constantine, the church took her model of ecclesiastical territorial division from the state, and as the empire was divided into provinces and dioceses, these terms continued to be used in regard to ecclesiastical jurisdiction. The term province now denotes a union of several dioceses under an archbishop, and may include several states, a country, or several countries. In the United States the Roman Catholic church has 12 provinces, each province comprising several dioceses. In the divisions for the order of Jesuits, North America is considered a province, having a superior to whom all the members are subject.

PROVINCETOWN, a t. in s.e. Mass., at the extremity of Cape Cod; pop. '80, 4,345. It is 4 m. long by 3 m. in width at its widest portion, forming a convenient curve to shelter a harbor s.e. of the town, 3 by 5 m. in area, 30 fathoms deep, and free from sand-bars and rocks, while the coast outside is the terror of seamen. It contains 3 marine railways, 30 wharves, a national bank with a capital of $200,000, a savings-bank, and 3 marine insurance companies with an aggregate capital of $250,000. It has a well-organized fire department, a weekly newspaper, public schools, hotels, a public library of 2,200 vols., and 5 churches. The houses are built principally of wood, the main street running parallel with the shore, crossed at right angles by shorter ones, the scorching heat of the sun on the sand being tempered by beautiful shade trees. As a summer resort it possesses peculiar attractions. Many of the inhabitants are engaged in cod and mackerel fishing, thousands of barrels of fish annually being caught, and in 1875, 185 vessels were owned in the town. It is 55 m. by water from Boston; 118 m. by rail, the Old Colony railroad terminating at one of its s. wharves.

PROVINCIAL OF AN ORDER is the superior of all the houses, and all the members of a monastic order, within any particular province. The office is generally held for a stated term of years, and in most orders the appointment to it rests with the general (q.v.).

PROVINS, an old t. of France, in the department of Seine-et-Marne, 59 m. e.s.e. of Paris, occupies a valley irrigated by two streams, the Dartein and the Voulzie, whose waters are employed to turn 50 or 60 corn-mills in the district. It is surrounded by ancient walls, flanked by ruined watch-towers, and is divided into the high and low towns. In the former is an ancient tower built during the middle ages, but vulgarly called the *tour de César*. The vicinity was long famous for its roses, still cultivated to a considerable extent. Pop. '76, 7,176.

PROVISION (Lat. *provisio*, from *providere*, to provide), in church law, means the bestowing an ecclesiastical benefice, and involves two stages—the designation of the person on whom it is bestowed, and the actual collation (Lat. *collatio*) of the benefice, which is completed by his taking possession. Both these acts fall properly to the ecclesiastical authority; but by usage of a very early date, the state, and often individuals, are admitted to a share in the provision of ecclesiastical benefices. In the mediæval church the claim of the sovereign to the provision of vacant bishoprics was often the subject of contention with the popes (see Investiture), but at all times the right of final and complete provision was admitted to belong to the pope. In later times, this claim has commonly been regulated by concordat. In most Roman Catholic countries the crown elects to bishoprics, and the pope is bound to confirm the nominee of the crown, unless canonical cause of rejection should appear. In the Russo-Greek church the candidates are presented by the holy synod, and the czar names the bishop from among them. In Protestant countries the election to benefices and dignities in the Roman Catholic church is generally by the chapters; but in some of them, as in Holland, Prussia, Hanover, a qualified veto is permitted to the crown. In the church of England the bishop is nominally elected by the chapter; but, in reality, the members of the chapter are only permitted to name the particular person whom the crown presents to them for election with the *congé d'élire*. In the Roman Catholic church of England and of Ireland, the parochial clergy, together with the canons, recommend three candidates, one of whom is commonly, although not necessarily, appointed by the pope. The conditions and usages of provision to parochial and other benefices have been explained under the head institution (q.v.). The completing act of provision is the installing in possession, which is described under the head induction (q.v.).

PROVI'SIONAL ORDER is an order granted under the powers conferred by an act of parliament, by a department of the government, by the secretary of state, or by some other authority, whereby certain things are authorized to be done, which could be accomplished otherwise only by an act of parliament. The order does not receive effect, however, until it has been confirmed by the legislature. Till that time, it is purely provisional; and even after it has been so confirmed, and is in reality an independent act, it retains the title of a provisional order.

Provisional orders have been in operation in England for many years, and have been found most useful in facilitating the modification or extension of the provisions of general acts, so as to adapt them to the special necessities of particular districts. A general statute, dealing with an extensive subject like police or sanitary improvement, could only embrace provisions suited to the requirements of the country generally, and could not be so framed as to meet exceptional circumstances. When these had to be provided for, private legislation was necessary; but the cost and delay attendant upon the promotion of local acts in the usual way were so great as in many cases to be practically prohibitory. What was needed, therefore, was a ready and inexpensive mode of obtaining local legislation, and the system of provisional orders was devised to meet that want. The general act embodied legislation generally applicable, and gave power to some board or officer to issue provisional orders, whereby the general act might be better applied to special districts or under peculiar circumstances. Such powers were by the public health act, 1848 (11 and 12 Vict. c. 63), conferred on the general board of health thereby constituted, but were by the local government act, 1858 (21 and 22 Vict. c. 98), transferred to the secretary of state. The turnpike trusts act, 1851 (14 and 15 Vict. c. 38), empowered the same functionary to grant orders in reference to the objects of that act; while the piers and harbors act, 1861 (24 and 25 Vict. c. 45), authorized the board of trade, with the sanction, in certain cases, of the admiralty and commissioners of woods and forests, to issue provisional orders dealing with a variety of important matters connected with the construction of piers and harbors, and the levying of dues and rates. The lands drainage act, 1861 (24 and 25 Vict. c. 133), gave power to the inclosure commissioners to issue orders for the purposes specified in that act; and the merchant shipping amendment act, 1862, gave, relatively to its objects, corresponding powers to the board of trade.

All these acts were in full and beneficial operation in England when the general police and improvement (Scotland) act, 1862 (25 and 26 Vict. c 101), was passed, and it conferred extensive powers on the secretary of state in relation to the granting of provisional orders for police and sanitary purposes. Subsequently, the Irish drainage and improvement of lands acts of 1863 and 1864 (26 and 27 Vict. c. 88, and 27 and 28 Vict. c. 72) enabled the commissioners of public works, and the oyster and mussel fisheries act, 1866 (29 and 30 Vict. c. 85), enabled the board of trade to issue orders in relation to the subjects of these acts respectively.

Nothing can be more diversified than the objects to be attained by provisional orders under the several acts above alluded to, and yet the course of procedure in relation to them all is substantially the same. A petition to the proper authority, specifying what is wanted, and supported by such evidence as can accompany the application, is made the subject of inquiry by a qualified person commissioned for the purpose. After due inquiry has been made, and the result has been reported to the authority to which the application is addressed, the petition is disposed of, either by giving or refusing what is asked, or by giving it in a modified form. When a provisional order is granted, steps are taken on behalf of the government to have it confirmed by parliament. In the case of orders issued under the general police and improvement (Scotland) act, for example, the requisite confirmation bill is framed, under instructions from the secretary of state, by the lord advocate, who takes charge of the measure through its various stages. When unopposed in parliament, ten days or a fortnight usually suffice for the passing of the requisite confirmatory act, which has all the facilities of a government measure. Of course, the whole expense connected with the preparation and passing of the order, and the relative confirmation act, is defrayed by the applicants; but the advantages of provisional orders, compared with ordinary private bills, are nevertheless considerable. A provisional order may be got with greater expedition and at much less cost than a private bill. It is exempted from the tedious and costly formalities of complying with standing orders and making deposits, with all the formidable fees of the house, and other incidental charges. When opposition is offered, the opponents are fully heard by the commissioner appointed to make the requisite inquiries; and the grounds of opposition are deliberately weighed, first by him, and afterwards by the superior authority to whom he makes his report. The opponents have thus the satisfaction of knowing that their case has been considered, with probably the same result as if it had been submitted at much cost to a parliamentary committee. There is, therefore, little inducement in ordinary circumstances to appeal directly to the legislature; and, as a consequence probably, an opposition to a provisional order in parliament is exceedingly rare. No doubt, if an opposition on feasible grounds were offered to a provisional order in parliament, the whole subject would be referred to a select committee, who would probably proceed as in the case of an opposed private bill; but that, as has been observed, is of so rare occurrence, that it does not detract from what has been said in regard to the advantages of the system as a rule.

PROVI'SORS, STATUTE OF. The object of this statute, 25 Edward III. st. 6, was to correct, and put an end to, the abuses which had arisen in the exercise of the papal prerogatives as to the disposal of benefices in England. See BISHOP; PATRONAGE.

PRO'VOOST, SAMUEL, D.D., 1742–1815; b. New York. He was descended from a Huguenot family, but at an early age entered the Episcopal church; graduated at King's (now Columbia) college in 1758; went to England in 1761, and entered as fellow-commoner of St. Peter's college, Cambridge, and was ordained. Returning to New York he became assistant minister at Trinity church; resigned in 1770 and retired to a small farm in Dutchess co., devoting himself chiefly to literary and scientific studies until near the close of the war. In 1783, on the evacuation of New York by the British troops, he returned to the rectorship of Trinity church, where he remained for 17 years. In 1785 he was chaplain to the continental congress. In 1786, at the first general convention of the church, he was elected bishop, and proceeding to England was consecrated at Lambeth in 1787 by the archbishop of Canterbury. In 1789 he was chaplain to the United States senate. In 1800 he resigned the rectorship of Trinity church, and in 1801 the bishopric. The latter was not accepted, but Dr. Benjamin Moore was chosen his assistant. Bishop Provoost wrote a copious index to the *Historia Plantarum* of John Bauhin.

PRO'VOST (Lat. *præpositus*, set over), in church law, the chief dignitary of a cathedral or collegiate church, from which use the title has also been transferred to the heads of other similar bodies, whether religious, literary, or administrative. Properly, however, the name is given to the highest dignitary in the metropolitan or diocesan chapter, and is often held conjointly with the archdeaconry. The provost is the next in dignity after the archbishop or bishop, a position which is also the right of the provost of a collegiate chapter. The name is also given to the superiors of certain religious houses of lesser rank, and the relation of which to the more important houses is analogous to that of the priory to the abbey. It was also given to certain lay officials, whose duties, in relation to the church and the maintenance of its material condition, were similar to those of the modern church-warden. In the Protestant church in Germany, the name provost is sometimes used as synonymous with that of dean or arch-priest; and occasionally, where several minor churches or chapels are attached to one chief church, the minister of the latter is called "provost."

In England the heads of several colleges in the university of Oxford, and the head of King's college, Cambridge, are designed provost. The head of Eton college is also so called. The provost of the mint is a judge appointed to apprehend and prosecute false coiners.

In Scotland the chief municipal magistrate of a city or burgh is called provost, the term corresponding to the English word mayor. The provost presides in the civic courts along with the bailies, who are his deputies. The chief magistrates of Edinburgh and Glasgow are styled lord provost, and the claims of the provosts of Aberdeen and Perth to the designation of lord, although at one time contested, are now held to be fully established. The right to this distinction does not seem to depend on anything peculiar in the nature of the constitution of these municipalities, but on its being expressly conferred by the crown, or sanctioned by royal usage. The lord provost of Edinburgh is entitled to the prefix "right honorable," which may be attached not merely to the name of his office, but to his Christian name and surname, a usage which probably originated in the circumstance that the lord provost of Edinburgh was *ex officio* a member of the old Scots privy council. Within the city and liberties of Edinburgh, the lord provost takes precedence next after members of the royal family. The lord provost of Glasgow is generally styled the "honorable," a prefix, however, which belongs only to his office, and cannot be attached to his name.

In France, there were formerly various descriptions of inferior judges, known under the name of provost (*prévôt*). The grand provost of France had jurisdiction in the king's house and over its officers.

PROVOST-MARSHAL, in the *navy*, is a person appointed to have charge of a prisoner before a court-martial, and until the sentence of the court is carried into execution. In the *army*, the provost-marshal is an officer, with the rank of capt., apointed to superintend the preservation of order, and to be, as it were, the head of the police of any particular camp or district. He has cognizance of all camp-followers, as well as of members of the army. His power is summary, and he can punish an offender, taken *flagrante delicto*, on the spot, according to the penalties laid down in the mutiny act.

PROW (from the Latin *prora*) means, generally, the fore-part of a ship, or more especially the beak or pointed cut-water of a galley, polacre, or xebec.

PROXY (contracted for procuracy), the agency of one person who acts as substitute for another. Every member of the house of lords can (by license, in theory supposed to be obtained from the sovereign) appoint another lord of parliament his proxy to vote for him in his absence. A spiritual lord can, however, only be proxy for a spiritual lord, and a temporal for a temporal lord, and no peer can hold more than two proxies at the same time. Proxies cannot be used in judicial cases, or where the house is in committee, nor can a proxy sign a protest.

PRUDENTIUS, Aurelius Clemens, a Christian poet of the 4th c., was a native of Spain, and was b. 348 A.D. Nothing is known regarding him except what he has himself told in a poetical autobiography prefixed to his works. From this we learn that he received a liberal education, was admitted to the Roman bar, practiced as a pleader, discharged the functions of civil and criminal judge, and was ultimately appointed to a high office at the imperial court. The year of his death is not known. In his youth, Prudentius was fond of pleasure, and very dissipated; but as he grew old, he became very devout, and his writings (which are all in Latin verse) reflect the latter phase of his character. The principal are—1. *Cathemerinon Liber* (Book [i.e., of hymns] for Daily Use), being a series of twelve hymns, the first half of which were reckoned by the author suitable for devotional purposes at different parts of the day; 2. *Apotheosis* (a defense of the doctrine of the Trinity against heretics); 3. *Hamartigeneia* (On the Origin of Evil, a polemic, in verse, against the Marcionites); 4. *Psychomachia* (The Triumph of the Christion Graces in the Soul of a Believer); 5. *Contra Symmachum, Liber* 1 (a polemic against the heathen gods); 6. *Contra Symmachum, Liber* 2 (a polemic against a petition of Symmachus for the restoration of the altar and statue of Victory cast down by Gratian); 7. *Peri Stephanōn Liber* (14 poems in praise of Spanish and other martyrs for the faith); 8. *Diptychon* (48 poems of four verses each, on Scriptural incidents and personages). Bentley calls Prudentius "the Horace and Virgil of the Christians," which may be true enough if the critic only meant to say that Prudentius is the first of the early Christian verse-makers; but is ridiculous if he intended to hint at a comparison with these masters of poetic elegance and grace.

PRUD'HOMMES, Council of (from Latin *homo prudens*), municipal tribunals, which existed first in the middle ages at Marseilles, Lyons, and perhaps elsewhere in France, exercising an equitable jurisdiction as arbiters of disputes between masters and workmen. Similar tribunals, under the same name, were re-introduced by Napoleon I. in 1806, and have been found of great practical utility. They now exist—or recently existed—in Lyons and Paris. They were instituted in the former town in 1806, in favor of the silk trade and other trades immediately connected with it. The council consists of manufacturers, mercers, master-workmen, foremen, dyers, and common workmen, elected among themselves. The council is empowered to dispose finally of all differences between manufacturers and their workmen, or between master-workmen, companions, and apprentices, where the sum in dispute does not exceed 200 francs; and it may also take cognizance, subject to an appeal to the tribunal of commerce or tribunal of first instance, of similar disputes, whatever their amount. Other functions of a miscellaneous nature belong to the council of prud'hommes, including the inspection of the workshops, in order to obtain information regarding the number of looms and of workmen, and the giving an opinion, when required by the administrative authorities, on any question submitted to it. In 1844 a council of prud'hommes was established in Paris in favor of the metal trade, and all trades connected with it; and three new councils of the same kind were instituted in Paris in 1847—one connected with the manufacture of tissues of all kinds, another with the manufacture of chemicals, and a third having jurisdiction in all other trades.

PRUNEL'LA, a genus of plants of the natural order *labiatæ*, having the upper lip of the calyx 3-toothed, the lower lip bifid; the upper lip of the corolla arched and nearly entire; the lower lip 3-lobed; and four filaments, each with two teeth at the extremity, of which one bears the anther. Several species are natives of Europe; one only is found in Britain, *P. vulgaris*, popularly known as Self-heal, a plant very frequent in moist and barren pastures, as it is also throughout most parts of Europe, central Asia, North America, and New Holland. It has oblong-ovate stalked leaves, and violet-blue flowers, very densely whorled, so as to form an imbricated oblong spike. It was at one time in considerable repute as a febrifuge. It is mildly aromatic and slightly astringent.

PRUNES are dried fruit of the plum-tree (*prunus domestica*), of the variety called *Juliana*, which is so largely cultivated in France, that not only is that country supplied, but Britain also imports from thence over 400 tons per annum. They are much used in the manufacturing districts of England by the operatives, who make puddings and pies of them when fresh fruit is out of season. The very fine kind which are sold in highly ornamental boxes are called French plums or table prunes; these are a much finer variety, viz., *Catherinea*, which are much larger, and, when ripe, are much sweeter.

They are more carefully prepared, being gathered by hand, and separately dried. They are used chiefly as a dessert fruit. The imports of these into Britain amount to upward of 200 tons per annum.

PRUNING, the removal of branches from fruit or forest trees, in order to the greater production of fruit, the improvement of the timber, or purposes of ornament. In pruning for ornamental purposes, taste must chiefly be consulted, but reference must be made to what has been too little regarded in pruning of every kind—the nature or habit of the tree itself. Some trees will bear clipping into fantastic forms, which would be utterly destructive of others. Such forms, once esteemed as the finest ornaments of a pleasure-ground, or the neighborhood of a mansion, are rejected by the simpler taste of the present age, and the *topiarian art* has few admirers. Much may be done, however, by the removal of branches, to give a finer form to ornamental trees; but in this, as in the pruning of trees grown for the sake of their timber, a great mistake is very generally committed in permitting branches to grow to a considerable size before they are cut off. It may be accepted as a general rule, that the branches removed should be small in proportion to the whole bulk of the tree. The removal of twigs and small branches is attended by no bad effects, and may be beneficial; but the removal of large branches is dangerous. The leaving of stumps or snags is an aggravation of the evil. They rot away, and spoil the timber of the stem; indeed, a hole is not unfrequently formed. But as to forest trees, pruning may with great advantage be in great part avoided, by taking care to plant at proper distances, and thinning out the plantations sufficiently in early periods of their growth. In this way, better timber is obtained, and a greater produce from the land. Pines and firs scarcely ever require pruning, and are probably in almost all cases the worse of that which they get, except in the removal of those lower branches which have actually begun to decay. In other trees, it is sometimes of importance to watch for branches that would divide the trunk, and to prevent the division, causing the main stem to ascend higher before it forms a crown; but to be of any use, this must be done while the branches are still very young. Plantations should, therefore, be examined with a view to pruning, at intervals of not more than two years, after they are six or eight years old.

In orchards and fruit-gardens, pruning is necessary, the object being not to produce timber, or the utmost luxuriance of trees, but fruit in the greatest perfection and abundance. The habits of each kind must be studied. Even in the pruning of gooseberry and currant bushes, regard must be had to natural diversities, the gooseberry and black-currant producing fruit chiefly on young wood, while the red and white-currant produce fruit chiefly on spurs from older branches. And so it is among trees; apricots, for example, producing fruit chiefly on young wood; cherries mostly on spurs, while plums produce both in the one way and in the other. The object of the gardener in pruning is to bring the tree into the condition best suited for producing fine fruit and in the greatest abundance; and to this the training of wall trees (q.v.) must also be accommodated. Sometimes, in order to produce particularly fine fruits for the improvement of the variety by seed, or for the sake of a prize at a horticultural exhibition, the gardener diminishes the number of branches likely to bear fruit, beyond what would otherwise be desirable.

The general seasons of pruning are winter and spring; but some trees, particularly cherries, are advantageously pruned in summer, as they then throw out less gum.

Pruning instruments are of various kinds—knives, axes, saws, bills of very various forms, etc., and the *averuncator*, which may be described as a pair of scissors, one blade hooked or crooked, attached to a long handle, and working by a cord and pulley. It is scarcely used except for standard trees in gardens and orchards.

PRU'NUS. See PLUM.

PRUNUS VIRGINIANA. See CHOKE-CHERRY, *ante*.

PRURI'GO is a non-contagious affection of the skin, in which intense itching is the most prominent symptom. Sometimes the parts affected present no marked deviation from the normal type, but most commonly they are covered with papulæ, which are nearly of the same color as the skin. Hence prurigo has been placed among the popular diseases of the skin. William makes three varieties of this disorder—viz., *P. mitis*, *P. formicans*, and *P. senilis*. This affection seldom affects the whole surface; its favorite seats being the neck, the shoulders, the back, the outer surface of the limbs, the anus, etc. In *P. formicans* there is not only intense itching, but patients complain of a feeling like the creeping of ants (hence the specific name) or the stinging of insects, or as if hot needles were thrust into the skin. All the forms of this disease are aggravated by exposure to the air, and by heat, and the sensations are often so distressing after the patient has become warm in bed, as to prevent sleep for many hours. *P. senilis*, occurring, as its name implies, in old persons, is characterized by the extreme severity and permanence of the itching, and by the obstinacy with which it resists every kind of treatment. The different varieties of this disorder may probably be often traced either to disease of the digestive system, or to want of personal cleanliness; but in most cases their origin is obscure.

In the treatment of this disease, attention should be paid to the diet. All stimulating condiments and drinks should be forbidden, and only a plain, easily digested food allowed. Internal remedies are seldom of use excepting opium, which in severe cases is required in free or large doses, in order to procure rest. The local applications that have been recommended are very numerous. Lotions of spirit, diluted vinegar, solution of acetate of ammonia, glycerine, prussic acid, etc., and ointments containing creasote, iodide of sulphur, aconitine, etc., have been advocated by various physicians of eminence. Unless, however, the greatest attention is paid to personal cleanliness, no remedy is likely to be of permanent benefit.

PRUSA, or PRUSIAS. See BROUSA, *ante*.

PRUSSIA (Ger. *Preussen*), a kingdom embracing nearly the whole of northern Germany. It is bounded n. by the German ocean, Jutland, and the Baltic; e. by Russia and Poland; s. by Austria, Saxony, Saxe-Altenburg, Saxe-Weimar, Gotha, and others of the smaller German states, Bavaria, Hesse-Darmstadt, and Alsace-Lorraine; w. by Belgium and the Netherlands. Prussia owns besides the detached domains of Hohenzollern (q.v.) and Jaade or Jahde on the North sea, which lie within the boundaries of other German states.

The following table gives the area and population (1875) of the 12 Prussian provinces:

		Area in sq.m.	Pop. in 1875.
1.	Prussia	24,116	3,200,484
2.	Brandenburg	15,401	3,132,483
3.	Pomerania	11,628	1,462,310
4.	Posen	11,177	1,608,956
5.	Silesia	15,558	3,851,960
6.	Saxony	9,743	2,171,858
7.	Sleswick-Holstein	7,224	1,074,812
8.	Hanover	14,855	2,018,868
9.	Westphalia	7,799	1,907,195
10.	Hesse-Nassau	6,021	1,469,902
11.	Rhenish Prussia	10,418	3,807,120
12.	Hohenzollern	441	66,614
	Total	134,376	25,772,562

The duchy of Lauenburg, with an area of 452 sq.m., and a population (1875) of 48,808, was incorporated with the province of Sleswick-Holstein in July, 1876, and is included in the estimate given.

In 1819 the total population of Prussia was 10,981,934. In 1858 it was 17,739,913. In 1867 the kingdom, increased from an area of 107,757 English sq.m. to its present size, had a population of 24,106,847. The census of Dec., 1871, gave a total of 24,689,252.

Physical Character, etc.—The larger portion of Prussia is a part of the great plain stretching from Holland to the Ural mountains, and, except in the s. of Hanover and Silesia, is an almost unbroken level. The Sudetic mountains, whose northern ranges, known as the Riesengebirge (q.v.), lie between the Oder and the Elbe, divide Prussia from Bohemia; while the Thüringerwald intersects the line dividing it from Saxony and some of the lesser German states. The Harz mountains (q.v.) of Hanover are now within the limits of Prussian territory. None of these ranges rise, even in their highest summits, above 5,000 feet. In the e. the surface of the great plain of Prussia is marked by two distinct tracts of more elevated land, one of which belongs to the elevation which, running generally parallel to the Baltic, may be traced from the mouth of the Elbe to the source of the Volga, and which in Prussia rises about 400 ft. above the sea-level. This tract is diversified with numerous lakes, none of which is more than 20 sq.m. in extent, but which altogether occupy an area of more than 300 sq. miles. The soil, consisting chiefly of loose sand interspersed with a large number of erratic blocks of granite, is sterile, covered in many places with heaths and belts of stunted pines. On the northern slope, terminating on the shores of the Baltic, there are several fertile districts, more especially along those rivers which have been carefully embanked, as the Niemen and the Vistula. The southern elevation of the Prussian plain, running between the Polish mountains of Sandomir in the s.e., and the Elbe between Magdeburg and Burg in the n.w., attains a height of about 1000 ft. near Breslau on the Oder, where it is known as the Trebnitz heights. Its general character is more fertile than the northern elevation; while the country between the two is, for the most part, extremely sterile. It includes the sandy waste in which Berlin, the capital, is situated. South of this tract, and in Silesia and Prussian Saxony, the country is fertile, including some of the most productive grain-growing districts of Prussia. Hanover has much the same character. Great marshes or peat-moors cover the n. and n.w. districts; but the valleys that lie among the Harz mountains in the s. are often fertile, and well adapted for agriculture. The coasts are low, and require to be protected from the overflowing of the sea by embankments and dikes. Sleswick-Holstein, the recently annexed territory n. of the Elbe, is in part sandy and heathy, like the plain of Hanover, but it has also numerous marshes. The great plain of northern Prussia is watered by five large rivers—the Weser, Elbe, Oder, Vistula, and Niemen; the numerous affluents of which, together with many smaller streams, contribute largely to the facilities of intercourse throughout the country, as many of them are navigable for vessels of several hundred tons.

The western and south-western parts of Prussia, comprising Rhenish Prussia, Westphalia, and Hesse-Nassau, are quite distinct in their physical character from the rest of Prussia. They are divided by the Rhine into two portions, each of which has an elevated and a low plain. On the w. bank of the river, the level land terminates in the northern extremity of the Vosges, or, as they are here called, the Hardt, mountains, and extends northward as far as Aix-la-Chapelle. This table-land is broken along the banks of the Moselle by ranges of the Hochwald and the Soonwald, the highest summit of which, Walderbsenkopf, attains an elevation of about 2,700 feet. The plain n. of the Moselle, which is known as the Eifel and the Hohe Veen, has a mean elevation of 1600 ft., with a few higher hills. The level country between the Rhine and Maas, bordering the Eifel, is extremely fertile. On the e. side of the Rhine, the table-land, rising along the banks of that river and the Main, terminates in the ridge of the Taunus, whose highest summit, the Feldberg, attains a height of more than 2,800 feet. In the n., the plain ends in the Westerwald between the Lahn and the Sieg, and in the Sauerland between the Sieg and the Ruhr. The Teutoburgerwald and the Harz mountains cut off this region from the sandy and heathy wastes of northern Prussia. The soil is generally poor in these districts, which, however, possess special sources of wealth in their iron and coal mines. But Hesse-Cassel, which forms part of the central plateau of Germany, is particularly fruitful, cereals of all kinds growing abundantly.

The narrow valley of the Rhine is noted as one of the most picturesque and beautiful parts of Germany. The Rhine (q. v.) is navigable throughout its entire course in Prussia, which it traverses from s. to n., receiving numerous other rivers—as the Lahn, Wied, Sieg, Wupper, Ruhr, Lippe, Berkel, and Vechte on the right; and on the left, the Ahr and the Moselle, the latter of which is navigable for more than 150 m. within the Prussian dominions. The Weser, the Elbe, the Oder, and the Vistula, as also the Spree and the Havel, affluents of the Elbe, are of high importance for the inland navigation of Prussia, and are each discussed in special articles. The great rivers of north Germany are connected by an extensive system of canals, such as the Seckenburger, the Friedrichsgraben, the Finow, Bromberger, and Friedrich Wilhelms, and the Plauensche.

Climate, Products, etc.—The climate of Prussia presents great differences in the eastern and western provinces—the former being exposed to heavy snow-storms in the winter, and great droughts in the summer, and with a mean annual temperature of 43°, has a summer mean temperature of 61°, and winter, 26° Fahr.; while the latter, which have milder winters, and a larger fall of rain, have a mean annual temperature of 49°.5—summer, 63°, and winter, 35° Fahr.

Agriculture and the rearing of cattle constitute the principal sources of employment and wealth of the rural population of the entire monarchy, and the state has hitherto directed its unremitting attention to the furtherance of the one, and the improvement of the other; abrogating onerous land-taxes, advancing money to landowners, encouraging agricultural institutions, introducing approved breeds of animals, and improved farm implements, etc. About one-half, or 12,000 000, of the population of the kingdom are engaged in agriculture as their sole or chief occupation. Large estates, as a rule, are only to be found in the eastern and least populated provinces of the monarchy. A survey, taken in 1858, gave 1,099,000 landowners, possessing each less than 5 morgen, or 3¼ acres. Wheat, rye, oats, barley, peas, millet, rape-seed, maize, linseed, tobacco, flax, hemp, hops, chicory, are extensively cultivated, and largely exported. The finest grain districts are the Börde, near Magdeburg, the low-lands on the Wartha and Netze, and on the Plöne and Madüe lakes, the north-eastern parts of Pomerania, the island of Rügen, the valleys of the Oder in Silesia, of the Saale, Moselle, Saar, and parts of Hesse-Nassau. Potatoes have of late years been largely grown. Western Prussia is noted for its excellent fruits and vegetables, and its provinces stand pre-eminent for their wines. Nassau is specially famous for its Rhine wines, Hochheimer, Johannisberg, Rudesheimer, and Asmannshaüser. The forest-lands, which are chiefly in East Prussia, Posen, Upper Silesia, Westphalia, Southern Hanover, and Hesse-Nassau, are of great value and considerable extent, occupying an area of 10,000,000 English acres. The mineral products of Prussia include coal, iron, lead, zinc, copper, cobalt, antimony, manganese, arsenic, sulphur, alum, nickel, black-lead, baryta, gypsum, slate, lime, freestone, salt, amber, agate, jasper, onyx, etc. All metals, salt, precious stones, and amber belong to the crown. The latter substance is found almost exclusively along the Prussian coast from Dantzic to Memel, where it is fished, dredged for, or dug up near the shore. Prussia has upward of 100 mineral springs, of which the most noted and efficient are the sulphur baths of Aix-la-Chapelle and Ems, the iron springs of Schwalbach, Wilhelmsbad, Driburg, and the hot and saline baths of Reinerz, Landeck, Flinsberg, Freienwalde, Lauchstedt, Wiesbaden, Schlangenbad, and Selters.

East Prussia is noted for its royal studs, and the excellent breed of horses which it now raises, and of which large numbers are annually exported. Westphalia enjoys a special reputation for the excellence of its hams and pork, Pomerania for its smoked geese, and Brandenburg and Hanover for honey and wax.

Fish of all sorts are abundant in the rivers and numerous lakes; seals are taken in the Baltic. The wooded districts abound in game of every kind; pheasants, partridges, and wild-geese being often found in enormous quantities. Besides stags, fallow-deer, wild boars, foxes, otters, weasels, polecats, martens, badgers, hares, and rabbits, the lynx, bear, eagle, and beavers are occasionally met with.

Manufactures, Commerce.—The principal manufactures are linens, for which certain districts of Silesia, Prussian Saxony, and Brandenburg enjoy a European celebrity; while of late years, the cotton manufactories, worked by steam, have maintained a successful rivalry with the older linens, worked by hand-looms. Besides these, there are numerous manufactories of silk, wool, mixed cotton and linen fabrics; including fine shawls and carpets in Brandenburg, stockings and ribbons in the Rhenish provinces, where, as well as in Westphalia and Hesse-Nassau, the flax, hemp, and silk and cotton thread is mainly prepared for the manufacturers. These districts, moreover, stand foremost in regard to the preparation and manufacture of iron, steel (the steel and gun works of Krupp, at Essen, being world-famous), and other metallic wares, paper, leather, soap, oil, cigars, and tobacco, and for the number of their distilleries and breweries; while Saxony and Silesia have the largest number of chicory, starch, beet-root, gunpowder, and glass works. Berlin and Elberfeld rank as the two most important centers of manufacture in the continent. The region of the Harz in Hanover is famous for its mining industries. In 1874 there were altogether in Prussia 2,525 mines, producing coal, lignite, and iron, zinc, lead, and copper ores, and employing 239,841 persons, the value of the produce being estimated at 148,200,842 thalers. In the same year the smelting-works and foundries amounted to 1074, employing 121,792 persons, the value of the produce being 194,798,875 thalers.

The commerce of Prussia is materially facilitated by her central European position, and the net-work of river and canal navigation, which makes her territories the connecting medium between several of the great European states, and which, with 11,000 m. of railway, 22,000 m. of public roads (all, or nearly all, formed since the time of Frederick the great), and a sea-line of 700 m. on the Baltic, and 200 on the German ocean, give her a free outlet to the rest of the world. The Prussian mercantile marine, in 1875, numbered 3,103 vessels, of 496,387 tons. The chief ports are Memel, Pillau, Königsberg, Dantzic, Colberg, Swinemünde, Stettin, Wolgast, Stralsund, Kiel, Flensborg, Altona, Harburg, Geestemünde, Leer, and Emden. The principal commercial towns are Berlin, Königsberg, Breslau, Barmen, Elberfeld, Dantzic, Stettin, Cologne, Magdeburg, Aix-la-Chapelle, and Frankfort-on-the-Main. Annual fairs are still held at Breslau, Magdeburg, and Frankfort-on-the-Oder.

The money, measures, and weights of Prussia are those in use throughout the German empire. In accordance with the law of 1872, the *mark* is the unit of reckoning, and has gradually displaced thalers (q.v.) and silbergroschen. The Prussian or Berlin bank, founded in 1765, with numerous branches in the provinces, is the most important of those banks which possess the right of issuing notes.

Religion, etc.—The dominant religion is Protestantism, and since 1817 the Lutheran and Reformed churches have been united under the head of one common evangelical church. Everything connected with the external administration of church matters is under the control of the minister of public instruction and ecclesiastical affairs, but every religious community manages its own internal concerns; the Protestant churches acting in conjunction with consistories or boards appointed by the government, one of which exists in each province, under the direction of the upper president, or provincial governor, and clerical superintendent-generals, who, in Posen and Pomerania, bear the title of bishop; while the Roman Catholic church is directed by the two archbishops of Posen and Gnesen and Cologne, under whom stand the four bishoprics of Culm, Münster, Paderborn, and Treves. The two episcopal sees of Breslau and Ermeland are directly under the jurisdiction of the pope, while the district of Glatz, in Silesia, belongs to the archbishopric of Prague, and Katscher, in Upper Silesia, to that of Olmütz. The results of the census of 1871, as regards the numbers of the religious bodies, are as follows: the Protestants of Prussia numbered 16,041,215; the Roman Catholics, 8,268,309; other Christian sects, 53,993; Jews, 325,565. This gives a percentage of 64.96 of the population to Protestantism, and of 33.48 to Roman Catholicism, yet it is significant that the number of Roman Catholic clergy is nearly as great as that of the Protestant clergy. The higher Roman Catholic clergy are paid by the state, the archbishop of Breslau receiving £1700 a year, and the other bishops about £1185. The incomes of the parochial clergy of both sects arise mostly from endowments.

Education.—Education is compulsory in Prussia, and its management and direction are under the control of the state. In no country are better or ampler means supplied for the diffusion of knowledge among all classes of the community. Prussia has ten universities—viz., Königsberg, Berlin, Greifswald, Breslau, Halle, Göttingen, Münster, Bonn, Kiel, and Marburg, which, in June, 1875, numbered 881 professors and teachers, and 7,783 students. The Prussian schools are divided into eleven classes—viz., 1. *Elementary*, embracing village or town schools; 2. *Bürgerschulen*, or citizen schools; 3. *Real-schulen*, or schools in which arts, sciences, and languages are taught; 4. Seminaries, or schools for training elementary school-masters; 5. *Gymnasien*, or high-schools for classical education; 6. Industrial schools; 7. Schools of architecture; 8. Schools of mines; 9. Schools of agriculture; 10. Veterinary schools; and, 11. Universities. At the end of 1874, there were in Prussia 34,989 elementary schools, with 55,585 teachers and

8.993,323 pupils. The management of the elementary national schools is in the hands of the local communities; but the state appoints the teachers, and in part pays their salaries, the remainder being supplied by the public. In addition to the libraries of the several universities, there is the royal library at Berlin, with 700,000 volumes and about 15,000 MSS. Among the numerous scientific, artistic, and literary schools and societies of Prussia, the following are some of the more distinguished: the academy of arts, founded in 1699; the royal museum of arts; the academy of sciences; the natural history, geographical, and polytechnic societies of Berlin; the antiquarian society of Stettin; the Breslau natural history and historical societies, etc.

Justice.—The highest court of law is the upper tribunal in Berlin, and each province has its special court of appeal. Besides these there are 125 magisterial, 7 commercial, and numerous military courts. In the Cologne district, the *code Napoléon* is in force, and in Hither-Pomerania, the common German law; but in other parts of the kingdom the Prussian code (*Landrecht für die Preussischen Staaten*), compiled under Frederick the great's direction, and introduced in 1794, is followed. A new penal code was promulgated in 1850, by which all pre-existing seigniorial, municipal, or ecclesiastical rights of decreeing punishments were unconditionally abrogated. Members of the royal family are amenable to special laws and courts. Lesser courts for the settlement of minor debts and disputes, and juries, have been introduced in every province of late years, and publicity is demanded by the constitution in the conduct of criminal cases. The administration of military matters is under the control of the minister of war; military courts are presided over by two civil and three military officers, and are subordinate to the local provincial courts of appeal.

Army, Navy, etc.—In July, 1876, the strength of the Prussian army on a peace-footing, according to official returns, numbered 319,824, of whom 53,294 were cavalry and 36,690 artillery. On the war-footing, the numbers can be raised to 900,000. The army consists of the regular troops and the landwehr (q.v.), and in time of war an extra force can be called up under the title of the landsturm. Every able-bodied male Prussian is liable to be called upon to serve between 20 and 36 years of age (see GERMANY). Mennonites (see ANABAPTISTS), clergymen of the Roman Catholic and Evangelical churches, and indispensable supporters of families are exempt. The time of active service is three years for some branches of the service and two for others. In peace, the army lies distributed over 309 garrison towns and 29 fortresses, of which latter the following are fortified places of the first rank: Mainz, Coblenz (with Ehrenbreitstein), Cologne, Königsberg, Madgeburg, Spandau, and Posen. Great care is bestowed on the education and military training of officers and men; and besides numerous admirable academies, there are several good schools of operative and veterinary surgery, etc., connected with the educational department of the army. The navy of the German empire is the navy of Prussia. See GERMANY.

Constitution, etc.—Prussia was an absolute monarchy till the crisis of 1848, when the decided movement in favor of liberal views compelled the late king to convoke a national assembly, and submit to the establishment of a constitutional form of government, which has been repeatedly modified. The national representative body consists of two bodies. 1. An upper chamber (*herrenhaus*, or "house of lords"), which is now composed of the princes of the royal family who are of age, the chiefs of the mediatized princely houses, recognized by the congress of Vienna, and numbering 16 in Prussia, the heads of the territorial nobility (about 50), life-peers chosen by the king from the class of rich land-owners, manufacturers, and "national celebrities," a titled representative chosen by all land-owners in each of the Prussian provinces, representatives of the universities, the burgomasters of all towns having more than 50,000 inhabitants, and an indefinite number of members appointed by the king for life or for a limited period. 2. A lower chamber (*abgeordnetenhaus*, or "chamber of deputies"), composed of 432 members, 352 for the old kingdom and 80 for the provinces annexed in 1867. Every Prussian who has attained his 25th year, and who has a municipal vote, has also a parliamentary vote, but not a direct one. Out of every 250 *urwähler*, or electors in the first instance, is chosen a *wahlmann*, or direct elector. This is the man who, strictly speaking, votes for a member of parliament. Representatives are elected for three years. In addition to this general house of assembly, there are representative bodies for the provinces, communes, and circles, which debate and legislate in regard to local matters within their several departments. The council of state is composed of 8 ministers, under whose ministries are numerous departments, embracing almost every conceivable subdivision of foreign policy or internal legislation, since nothing can be done in Prussia independently of the state. By the modified constitution of 1850, all exclusive privileges arising from titles or station are abrogated, and perfect equality in the eye of the law fully recognized; liberty of the subject guaranteed in regard to religious persuasion, the right to hold meetings, unarmed, within closed doors, and become members of societies; immunity from domiciliary visits, and inviolability of letters, etc. The monarchy is hereditary in the male line. The sovereign and royal family must profess the evangelical confession of faith. The king, who is not responsible for the measures of his government, and whose decrees require the counter-signatures of his ministers, exercises the executive power, nominates and dismisses the ministry, summons and dissolves the chambers, orders the promulgation of the laws, is commander-in-chief of the forces, has the right of proclaiming peace and war, granting reprieves, etc. He bears the titles of king of Prussia, markgraf of Brandenburg, sovereign-duke of Silesia, prince of Orange, grand-duke of Pomerania and the Lower Rhine, beside a host of lesser titles. The title "emperor of Germany," by which he is now best known, is not, of course, a Prussian dignity. The arms of Prussia are composed of four central shields, borne on the great shield of 48 fields, representing the different territories incorporated in the Prussian monarchy. The black eagle on a field argent, surmounted by the open crown, is the special cognizance of Prussia proper. The national colors are black and white; the standard is white, bearing the Prussian crowned eagle and an iron cross in the right corner. The eldest son of the king bears the title of crown-prince. The ordinary royal residences are the palaces at Berlin, Potsdam, and Charlottenburg. The royal domains were ceded to the state by Frederick-William III. in 1820, on condition of a rental of 2½ millions thalers being paid first from them for the king and his family, which, however, has been largely increased of late years by means of a *krondotation* ("crown-allowance"). Among the numerous military orders, the following deserve notice: The order of the swan, founded in 1443, and that of the black eagle, founded in 1701, regarded as of the highest dignity.

According to the budget estimate for 1877-78, the receipts and expenditure for that year were calculated at 651,638,414 marks, or £32,581,920; while the funded national debt in April, 1877, in addition to debts for railways, etc., amounted to 1,058,550,472 marks, or £52,927,523.

Population, Races.—About seven-eighths of the population of Prussia are Germans. Of the Slavonic tribes, the most numerous are Poles, numbering 2½ millions. In Brandenburg and Silesia, there are about 83,000 Wends; in East Prussia, upward of 146,000 Lithuanians; Western Prussia has rather more than 10,000 Walloons, using the French language; intermixed in its generally German population, Silesia has 50,000 Czechs, or Bohemians; Sleswick-Holstein, 150,000 Danes—making in all about 3,000,000 who do not use the German language, or who employ it only as secondary to their native tongues.

Ranks, Classes.—Three distinct hereditary classes are recognized in Prussia, viz., nobles, burghers, and peasants. To the first belong nearly 200,000 persons, including the higher officials of the state, although that number does not comprise the various mediatized houses, of which 16 are Prussian, and others belonging to different states, but connected with Prussia by still existing, or former territorial possessions. The burgher class includes, in its higher branches, all public office-bearers, professional men, artists, and merchants; while the peasantry—to which belong all persons engaged in agricultural pursuits—are divided into classes, depending on the number of horses employed on the land, etc.

History.—The lands bounded by the Baltic, which now form part of Prussia, were early occupied by Slavonic tribes, nearly allied to the Letts and Lithuanians. It is conjectured that they were visited by Phenician navigators in the 4th c. B.C.; but beyond the fact of their having come into temporary conflict with the Goths and other Teutonic hordes, prior to the great exodus of the latter from their northern homes, little is known of the people till the 10th c., when they first appear in history under the name of Borussi or Prussians. In 997 bishop Adalbert of Prague suffered martyrdom at their hands, while endeavoring to convert the people to Christianity. Boleslas duke of Poland succeeded, however, about 1018, in compelling them to submit to baptism and subjection. After many futile attempts on the part of the people to throw off the yoke of Christianity and foreign domination, they finally made a successful stand against Boleslas IV. of Poland in 1161, and for a time maintained a rude and savage kind of independence, which the disturbed condition of Poland prevented its rulers from breaking down. The fear of losing their freedom if they adopted Christianity, made the Prussians obstinately resist every effort for their conversion; and it was not till the middle of the 13th c., when the knights of the Teutonic order entered upon their "famous" crusade against them, that the Christian faith was formally established among them. The aggressive inroads of the pagan Prussians on the territories of their Christian neighbors, and their advance into Pomerania, were the exciting causes of this important movement. The knights of the order, when appealed to by Conrad duke of Masovia to aid in the subjection of the heathen, gladly promised their services, on condition of being permitted to retain possession of the lands which they might conquer; and having entered the Prussian territories in considerable numbers, they intrenched themselves at Vogelsang and Nessau in 1230, and at once entered upon the conquest of Prussia. For half a century the belligerent brotherhood were engaged in war with the people—winning lands and souls by hard fighting—until at length, in 1283, they found themselves undisputed masters of the country, which they had both civilized and Christianized after a fashion, namely, by almost exterminating the pagan population. During this period of struggle, the knights founded the cities of Thorn, Kulm, Marienwerder, Memel, and Königsberg, repeopled the country with German colonists, encouraged agriculture and trade, and laid the foundation of a well-ordered, prosperous state. The unhappy wars between the knights and the Poles and Lithuanians, together with the moral degeneracy of the order, led, in the 14th and 15th centuries, to the gradual decline of their supremacy. In 1454 the municipal and noble classes, with the co-operation of Poland, rose in open rebellion against the knights, who were finally compelled to seek peace at any cost, and obliged, in 1466, to accept the terms offered to them by the treaty of Thorn, by which West Prussia and Ermland were ceded by them unconditionally to Poland, and the remainder of their territories declared to be fiefs of that kingdom. In 1511 the knights elected as their grand-master the markgraf Albert of Anspach and Baireuth, a kinsman of the king of Poland, and a cion of the Frankish line of the Hohenzollern family. Although his election did not immediately result, as the knights had hoped, in securing them allies powerful enough to aid them in emancipating themselves from Polish domination, it was fraught with important consequences to Germany at large, no less than to the order itself. In 1525 the grand-master was acknowledged duke of Prussia, which was converted into a secular duchy (afterward known as East Prussia), and renounced the Roman Catholic religion for Lutheranism, his example being followed by many of the knights. The country made rapid advances under the rule of Albert, who improved the mode of administering the law, restored some order to the finances of the state, established schools, founded the university of Königsberg (1544), and caused the Bible to be translated into Polish, and several books of instruction to be printed in German, Polish, and Lithuanian. His son and successor, Albert Frederick, having become insane, a regency was appointed. Several of his kinsmen in turn enjoyed the dignity of regent, and finally his son-in-law, Johann Sigismund, elector of Brandenburg, after having held the administration of affairs in his hands for some years, was, on the death of the duke in 1618, recognized as his successor, both by the people and by the king of Poland, from whom he received the investiture of the duchy of Prussia; which, since that period, has been governed by the Hohenzollern-Brandenburg house.

Here it will be necessary to retrace our steps in order briefly to consider the political and dynastic relations of the other parts of the Prussian state. In the 12th c. the northern mark, comprising probably the territory between the Elbe and the Oder, as far as its confluence with the Spree, was held by the immediate descendants of Albert the bear of Luxemburg, its first hereditary markgraf, who, during the next two or three centuries, extended their dominions eastward, beyond the Oder into Further Pomerania. On the extinction of this line, known as the Ascanian house, a remote kinsman, Frederick VI., count of Hohenzollern, and markgraf of Nürnberg, became possessed, partly by purchase and partly by investiture from the emperor, of the Brandenburg lands, which, in his favor, were constituted into an electorate. This prince, known as the elector Frederick I., received his investiture in 1417. He united under his rule, in addition to his hereditary Franconian lands of Anspach and Baireuth, a territory of more than 11,000 sq. miles. His reign was disturbed by the insubordination of the nobles, and the constant incursions of his Prussian and Polish neighbors, but by his firmness and resolution he restored order at home and enlarged his boundaries. Under Frederick's successors the Brandenburg territory was augmented by the addition of many new acquisitions, although the system of granting appanages to the younger members of the reigning house, common at that time, deprived the electorate of some of its original domains, as for instance the markgrafate of Anspach, which passed, on the death of the elector Albert Achilles in 1486, as an independent state to his younger sons and their descendants. The most considerable addition to the electorate was the one to which reference has already been made, and which fell to the elector John Sigismund through his marriage in 1609 with Anne, daughter and heiress of Albert Frederick the insane, duke of Prussia. In consequence of this alliance, the duchy of Cleves, the countships of Ravensberg, the Mark, and Limburg, and the extensive duchy of Prussia, now known as East Prussia, became incorporated with the Brandenburg territories, which were thus more than doubled in area. The reign of John Sigismund's successor, Georg-Wilhelm (1619–40), was distracted by the miseries of the thirty years' war, and the country was alternately the prey of the Swedish and imperial armies; and on the accession of Georg-Wilhelm's son, the great elector Frederick-William (q.v.), in 1640, the electorate was sunk in the lowest depths of social misery and financial embarrassment. But so wise, prudent, and vigorous was the government of this prince, that at his death in 1688 he left a well-filled exchequer, and a fairly equipped army of 38,000 men; while the electorate, which now possessed a population of one and a half million, and an area of 42,000 sq.m., had been raised by his genius to the rank of a great European power. His successors, Frederick III. (q.v.) (1688–1713), and Frederick-William I. (1713–40), each in his own way increased the power and credit of Prussia, which had been in 1701 raised to the rank of a kingdom. The latter monarch was distinguished for his rigid economy of the public money and an extraordinary penchant for tall soldiers, and left to his son, the great Frederick II. (q.v.), a compact and prosperous state, a well-disciplined army, and a sum of nearly nine million thalers in his treasury. Frederick II. (1740–86) dexterously availed himself of the extraordinary advantages of his position to raise Prussia to the rank of one of the greatest political powers of Europe. In the intervals between his great wars, he devoted all his energies to the improvement of the state, by encouraging agriculture, trade, and commerce, and reorganizing the military, financial, and judicial departments of the state. By his liberal views in regard to religion, science, and government, he inaugurated a system whose results reacted on the whole of Europe; and in Germany, more especially, he gave a new stimulus to thought, and roused the dormant patriotism of the people. Frederick was not over-scrupulous in his means of enlarging his dominions, as he proved by sharing in the first partition of Poland in 1772, when he obtained as his portion nearly all west Prussia, and several other districts in east Prussia. His nephew and successor, Frederick-William II. (1786–97), aggrandized his kingdom by the second and third partitions of Poland in 1793 and 1795. Frederick-William III. (q.v.), (1797–1840), who had been educated under the direction of his grand-uncle, Frederick the great, succeeded his father in 1797, at a time of extreme difficulty, when continental rulers had no choice beyond being the opponents, the tools, or the victims of French republican ambition. By endeavoring to maintain a neutral attitude, Prussia lost her political importance, and gained no real friends, but many covert enemies. But the calamities which this line of policy brought upon Prussia roused Frederick-William from his apathy, and with energy, perseverance, and self-denial worthy of all praise, he devoted himself, with his minister count Hardenberg, to the reorganization of the state. In the ten years which succeeded the battle of Waterloo. Prussia underwent a complete reorganization. Trade received a new impulse through the various commercial treaties made with the maritime nations of the world, the formation of excellent roads, the establishment of steam and sailing packets on the great rivers, and at a later period the organization of the customs-treaty, known as the Zollverein (q.v.), between Prussia and the other states of northern Germany, and through the formation of an extended net-work of railways. The most ample and liberal provision was made for the diffusion of education over every part of the kingdom, and to every class, In like manner, the established Protestant church was enriched by the newly inaugurated system of government supervention, churches were built, the emoluments of the clergy were raised, and their dwellings improved; but not content with that, the king wished to legislate for the church in accordance with a set plan; and when the various Protestant churches refused to be joined in the union prescribed for them, difficulties arose. This tendency to over-legislation has long been the predominating evil feature of Prussian administration; and the state, without regard to the incongruous elements of which it was composed, was divided and subdivided into governmental departments, which, in their turn, under some head or other, brought every individual act under governmental supervision, to the utter annihilation of political independence. The people, when they gradually began to comprehend the nature of this administrative machinery, saw that it made no provision for political and civil liberty. and demanded of the king the fulfillment of the promise he had given in 1815 of establishing a representative constitution for the whole kingdom. This demand was not acceded to by the king, and its immediate fruits were strenuous efforts on his part to check the spirit of liberalism. Every measure taken by other sovereigns to put down political movements was vigorously abetted by him. Siding with the pietists of Germany, he introduced a sort of Jesuitical despotism, which was continued by his successor, Frederick-William IV. The Landstände or provincial estates, organized in accordance with the system of the middle ages, were the sole and inadequate mode of representation granted to Prussia in this reign, notwithstanding the pledge made to the nation for a full and general representative government. An attempt made forcibly to unite Lutheran and reformed churches excited universal indignation, while the imprisonment, at a later period, of the archbishops of Cologne and Gnesen for their conduct in regard to the vexed question of mixed marriages, involved the king in a long and fruitless dispute with the pope. The accession of Frederick-William IV. in 1840 seemed to open a better prospect to the friends of constitutional freedom, but the reality was scarcely equal to the expectations which had been warranted by the professions of the government. Still, new hopes and requirements had been excited, and a new life was infused into every department of the state. Every branch of science, art, and literature was understood to receive the attentive consideration of the sovereign, who professed to be (and, doubtless, in a sort of way, was) actuated by a love of universal progress. He made similar professions in regard to religious toleration, but the pietistic tendencies of his government exerted a forced and prejudicial influence in every department of the state; while the bureaucratic spirit of over-governing which characterized the administration was becoming daily more and more irksome to the nation, and gave rise to the formation of free churches or Protestant communities; while a contemporaneous excitement which had arisen in the Roman Catholic church of Prussia, as the result of the schismatic movement due to the stand taken by the chaplain Ronge (q.v.) on the exhibition of the so-called holy coat of Treves (q.v.), further complicated the relations between church and state. The king and his advisers, underrating the importance of the movement of 1848 in Germany, thought they had satisfied the requirements of the hour by granting a few unimportant reforms, and making equivocal promises of further concessions. When at length, however, the citizens and troops came into collision, and blood was shed, Frederick-William came forward as the professed regenerator of his country, offering to lay down his royal title and merge his kingdom in the common fatherland, for the salvation of which he recommended a cordial union of all German princes and people in one bond, and proposing himself as the guide and leader of this new Germany. His own subjects, and many Germans in other states, hailed with delight professions which seemed to give a living embodiment to the national desire for unity. The publication of a political amnesty, the nomination of a liberal ministry, the recognition of a civic guard, the retirement of the prince of Prussia, the heir-presumptive—with whom every arbitrary measure of government was believed to originate—and the summons of a representative chamber to discuss the proposed constitution—all tended to allay the general discontent. It might have been well if the German states and the German democracy had resolved at this time to accept the leadership of Prussia, but the so-called national assembly at Frankfort declined to do this, and elected the archduke John of Austria lieut.gen. of Germany. A feeling of deep chagrin on the part of the Prussian king was the result of that extremely unwise and unpatriotic act, dictated by a fear of Prussian military strength, and oblivious of the fact that Prussia, in spite of its despotic government, was the country most thoroughly penetrated by Germanic ideas. His ardor in the cause of the fatherland cooled, his pledges to his own subjects remained unfulfilled as long and as completely as the occasion permitted, and his policy became more strongly tinged than before with a jealousy of Austria. His powerful co-operation in putting down the insurrection in Poland, and the democratic party in Baden, gave, however, ample proof of his determined opposition to every popular demonstration against absolutism. In the first war of the Sleswick-Holstein duchies, the Prussians acted in concert with the disaffected against their sovereign, the king of Denmark, occupying the ducal provinces in the name and on the behalf of the diet. The latter years of this reign were characterized by great advance in the material prosperity and internal improvement of the country. Extensive lines of railway and post-roads were opened, the river navigation greatly facilitated, treaties of commerce formed with foreign countries, and great expansion given to the Prussian and north German zollverein (q.v.), the army put upon a footing of hitherto unprecedented efficiency of arms and artillery, and the educational system of the country still further developed. The political freedom of Prussia did not, however, make equal advance. The chambers which met for the discussion and framing of a constitutional mode of government, were constantly interrupted and obstructed in the prosecution of their task, and the constitution was modified every year between 1850 and 1857, until it retained few of its original bases. Wilhelm I., who succeeded his brother in 1861, and in 1871 became German emperor, was no more a lover of constitutional, or at least of popular, liberty, than any of his predecessors; and for some years he strove hard to check the progress of the popular movement, in so far as it aimed at interference with the absoluteness of the regal power, and he repeatedly rejected measures of reform recommended by the Prussian chamber of deputies; but, on the other hand, it must be allowed that he has shown himself zealous for the honor and greatness of Germany above all other princes of the empire; and the exigences of the great war with France (1870–71) have compelled the Prussian government to bring itself into closer relations with popular feeling, though constitutional freedom is still far from being fully enjoyed. For the later history of Prussia, both military and political, see GERMANY, also GERMANY in SLESWICK-HOLSTEIN; and BISMARCK.

PRUSSIA, one of the eleven provinces into which the kingdom of the same name is divided, is bounded on the s.w. by Pomerania and the Baltic sea, and on the e. and s. by Russia and Poland. Area, 24,115 sq.m.; pop. '75, 3,200,484. It is divided into two districts or sub-provinces—e. Prussia and w. Prussia, of which the former is considerably the larger. About two-thirds of the soil consists of good land, the remainder being chiefly sandy. Agriculture is by far the most important branch of industry, manufactures being confined to such articles as supply merely local wants. Wheat is extensively cultivated, especially in the district of Gumbinnen; and, as the inhabitants live chiefly upon rye, the larger half of the wheat grown is exported. Prussia possesses a larger number of horses than any other province in the kingdom. For the history of the province of Prussia, and for its principal physical features, see PRUSSIA, KINGDOM OF.

PRUSSIAN BLUE. See BLUE, CYANOGEN, FERRO-CYANOGEN, and FERRID-CYANOGEN.

PRUSSIC ACID. See HYDROCYANIC ACID.

PRUTH, an important affluent of the Danube, rises in the s.e. of the Austrian crown-land of Galicia, on the n.e. side of the Carpathian mountains, and near the base of mount Rusky in that range. It flows in a deep valley eastward past Kolomea and Czernowitz, and from the point at which it leaves Austrian territory to its embouchure in the Danube at Reni, 12 m. below Galatz, it forms again, as it used to do before 1856, the boundary between the Russian province of Bessarabia and Roumania. Length about 500 miles. Swift in its upper course. the Pruth becomes navigable near Jassy. Its affluents are numerous, but inconsiderable.

PRYNNE, WILLIAM, noted as a pamphleteer and active politician during the reign of Charles I., and the subsequent period of the commonwealth, was born near Bath in the year 1600. He received his early education there, and was afterward transferred to Oriel college, Oxford, where, in 1620, he took his bachelor's degree. Selecting the law as his profession, he entered himself at Lincoln's inn, where he became a bencher and reader; but it does not appear that he ever very seriously endeavored to obtain practice at the bar. He was early drawn into the vortex of ecclesiastical controversy, and speedily made himself heard of as a champion of the puritan party. In 1632 appeared his *Histriomastix, or a Scourge for Stage-Players*, a tasteless and scurrilous attack on the popular amusements of the period, which procured him the attention of the authorities. For this performance he underwent prosecution in the star chamber, with results sufficiently unpleasant. His sentence involved him in a fine of £3,000, degradation from the bar, expulsion from Oxford and Lincoln's inn, the loss of both his ears in the pillory, and the shock to his vanity as an author of seeing his book burned in public by the hangman. He was, moreover, condemned to perpetual imprisonment, and immured in the tower accordingly. If the severity of the punishment seems, at first sight, astounding in its disproportion to the nature and amount of the offense, it is perhaps sufficiently explained by the fact that Prynne, by his previous issue of a series of anti-prelatical tracts, as by other indications of hostility, had made himself most obnoxious to archbishop Laud and the clergy. Three years after, the pertinacious offender found means to publish from his prison another pamphlet, in which he fiercely attacked the hierarchy, and was unsparing in his personal abuse of Laud and certain other bishops. For this he was again prosecuted; a fine of £5,000 was imposed upon him; he was once more pilloried, losing such stumps of ears as the executioner had before spared; and was branded on both cheeks with the letters S. L. (seditious libeler). He was then removed to Caernarvon castle, and afterward to that of mont Orgueil, Jersey, where he remained a close prisoner, till, in 1641—the long parliament then sitting—he was released by a warrant of the house of commons, and a tumultuous expression of popular sympathy celebrated his restoration to liberty. Shortly afterward he was sent to parliament as member for Newport, in Cornwall, and for some years was actively, and at times even prominently engaged on the popular side in the proceedings of the house of commons. In the extreme measures, however, leading to the deposition and death of the king, he declined all share; and being one of those of whom Cromwell shortly after "purged" the house of commons, he proceeded to assail him in print with an asperity not inferior to that with which he had before made war upon the bishops, as a consequence of which imprudence he was once more subjected to several years' imprisonment. On Cromwell's death he returned to his place in parliament, zealously interesting himself in the royal cause; and after the restoration, the office was bestowed on him of keeper of the records in the tower. Subsequently his inveterate habit of envenomed pamphleteering involved him in difficulties with the house of commons, from which, on a charge of seditious libel, he narrowly escaped expulsion. He died at Lincoln's inn in Oct., 1669. The continuous stream of writings on the perilous topics of the day, which brought him so constantly into trouble, represents but a fraction of Prynne's literary activity. He busied himself chiefly as a compiler of matter illustrative of constitutional and parliamentary history. His most valuable works in this field are the *Calendar of Parliamentary Writs,* and his *Records,* both of which contain much that is useful and important.

PRYOR, Roger A., b. Va., 1828; son of a prominent clergyman; educated for the profession of law. In 1850 he edited the *Southside Democrat* at Petersburg, Va.; in 1852-63 was attached to the staff of the Washington (D. C.) *Union.* In 1854 he had a diplomatic appointment to Greece, but in the following year returned to Petersburg and resumed the editorial chair. He also edited the Richmond (Va.) *South,* and the Washington *States,* extreme southern journals. In 1859 he went to congress, where he made himself notorious by advocating secession, and by challenging John F. Potter, of Wisconsin, to fight a duel. At the very beginning of the rebellion Mr. Pryor attached himself to the fortunes of the seceding states, and became a volunteer aid-de-camp to gen. Beauregard when the latter was investing fort Sumter. He rose to be a brig.gen. in the confederate army, and commanded a division in the battles before Richmond, but resigned Aug. 26, 1863. He was a member of the confederate congress, and in 1864 was captured by the federals, and was for a while imprisoned in fort Lafayette. After the war he was for a time an editor in Tennessee, but removed to New York and began practice at the bar. He was one of the counsel employed in the celebrated Beecher trial.

PRZE'MYSL, a t. of the Austrian empire, in the province of Easter Galicia, on the right bank of the San, an affluent of the Vistula, 53 m. w. from Lemberg. It is connected by railway with Cracow, and so with the w. and n. of Germany on the one hand, and with Lemberg on the other. Przemysl is a flourishing town, carrying on a considerable trade, and has manufactures of linens and leather. Pop. '69, 15,400.

PRZI'BRAM, a t. of the Austrian empire, in Bohemia, 33 m. s.s.w. from Prague, on the Litawka, a feeder of the Moldau. It derives its importance chiefly from extensive lead and silver mines in the neighborhood, and is the seat of a superior court of mines. Pop. '69, 9,299.

PSALMANAZAR, George, a somewhat remarkable impostor, was born about the year 1680. His real name and the place of his birth are unknown, but he is presumed to have been a native of Switzerland or the s. of France. He received a good education, and gave early indication of talent, more especially for the acquisition of languages. Impelled by a restless and impatient temper, which indisposed him to any regular pursuit, for some years he roamed over Europe as a mere vagabond adventurer, assuming at first the disguise of an Irish pilgrim, exiled on account of his religion; and afterward as soldier, menial, preceptor, beggar, or vagrant nondescript, living on his wits as he could, according to the whim or necessity of the hour. In the course of his wanderings he was thrown into contact with a col Lauder, commanding a Scotch regiment at Sluys, on whom he first passed the imposture to which he subsequently owed his notoriety, assuming the name by which he is since known, and representing himself as a Japanese convert to Christianity and native of the island Formosa. The good col. seems to have been completely deceived by him; not so, however, the chaplain of the regiment, one Innes, a man equally acute and unprincipled, who speedily detected the deception, but was not the less willing to use it for the furtherance of his own ends. By Innes, Psalmanazar was brought to England, and instantly became the religious lion of the day, his patron skillfully availing himself of the connection to secure for himself preferment in the church. Dignitaries of the church contended for the honor of being serviceable to him; and through the influence of the bishop of Oxford, apartments were assigned him at the university, in order that he might prosecute his studies there. The talent, ingenuity, and resource which he displayed in keeping up the deception, go far to account for what may seem to us the strange credulity with which his story was received. He published, in Latin, a fabulous account of the island Formosa, the consistency and verisimilitude of which imposed upon the learned world. He also invented a language, compact and somewhat complex in structure; and was able, in virtue of a memory not less than astonishing, to defy the ordinary methods of detection. In the midst of his success, however, at the age of about 32, he became the subject of religious impressions, and his conscience awoke to the ignominy of the deceit which he was practicing. Urged by what seems to have been a genuine feeling of penitence, he withdrew himself from public notice, and for the rest of his long life honorably earned his livelihood by literature, in which he had a moderate success. Besides much assiduous compilation for the book-sellers, of history, geography, and the like, he published several works anonymously, one of which, *An Essay on Miracles, by a Layman,* was for some time exceedingly popular. On his death in London, in 1762, it was found that he had also busied himself in preparing for posthumous publication an account of his curious career, which, under the title *Memoirs of ——, commonly known as George Psalmanazar, a reputed native of Formosa, written by himself,* was some years after given to the world.

PSALMODY, in its widest sense, is the singing of the Psalms of David and other sacred songs; but from the beginning of the reformation period, the term has been restricted to the singing of metrical versions of the Psalms to short simple airs. Psalm-singing was of ancient date among the Jews, and was practiced from the first ages of Christianity: the charge of Pliny the younger against the Christians was, that they sang Psalms to Christ "*quasi Deo.*" No authentic record, however, exists of the kind of melodies sung to the psalms by the primitive Christians. The practice of singing psalms in antiphony, or by two choirs, as still practiced (see ANTIPHONY), was introduced at an early period; it is said to have been begun in the eastern church by Ignatius, bishop of Antioch, in the 2d c.; and in the western church by Ambrose, bishop of Milan, in the 4th century. At first the whole congregation, clergy and laity, joined in the psalm; but difficulties and abuses arose from the growing neglect of musical cultivation; and, with a view of restoring public decency and order, the council of Laodicea, in the year 363, considered it necessary to forbid the laity to sing in church at all, except in certain simple chants of a popular description. Down to the reformation, the music of the church was surrendered to the clergy and trained musicians.

Psalmody, in the more modern sense, began in the 16th c., when Clement Marot, the court-poet of Francis I. of France, translated 52 of the psalms into French verse, dedicating them both to his royal master—whom he likened to the Hebrew psalmist—and to the ladies of France. The sacred song-book, on its first appearance, not being accompanied by music, it became the practice to sing the psalms to favorite tunes—often those of popular ballads, and for a considerable time psalm-singing became a favorite fashion among the gay courtiers of Francis. Marot's collection was continued and concluded by Theodore Beza, whose psalms had the advantage of being set to music, Beza having in this the assistance of Calvin, who engaged the best composers of the day to unite his sacred songs with beautiful and simple airs of a devotional character. Psalm-singing was taken up by the reformers, first for private devotion, and soon as part of the service of the church, Luther and Calvin restoring to the people their share in the musical part of public worship, and furnishing them with the means of performing it. From the time that psalm-singing was adopted by the reformers, it was discountenanced by the Roman Catholics, and soon came to be regarded as a badge of Protestantism. Luther and Calvin differed, however, in their ideal of psalmody: the former was favorable to harmony in parts, while the latter confined himself to the bare unaccompanied melody. Once taken up by the Calvinists and Lutherans, psalmody spread over France, Germany, and the Low Countries, and reached England at the moment of her embracing the reformation. The first English metrical version of the Psalms was made in the reign of Henry VIII. by Thomas Sternhold, a native of Hampshire, groom of the robes to king Henry, aided by John Hopkins and William Whyttinghame. Vocal psalmody was soon after introduced into the church-service, the choral mode of singing being still retained in cathedrals and collegiate churches, and the liturgic hymns being retained in the prayer-book. Of the psalm-tunes which came into use, some have been attributed to Claude Goudimel, Claude le Jeune, and Guillaume Franc, and a few owe their origin to Luther. The well-known 100th psalm is an adaptation of Gregorian phrases by Guillaume Franc. The first important collection of psalm-tunes for four voices published in England was made by Thomas Ravenscroft, Mus. Bac., and appeared in 1621; it was entitled "*The whole Booke of Psalms,* etc., composed into four parts by sundry authors, to such several tunes as have been and are usually sung in England, Scotland, Wales, Germany, Italy, France, and the Netherlands." In this collection were included contributions by Tallis, Morley, Dowland, and all the great masters of the day, as well as by Ravenscroft himself, who contributed the tunes St. David's, Bangor, and Canterbury. The name of John Milton, father of the poet, appears as composer of the tunes, York and Norwich. According to the then prevalent usage, the subject of air was given to the tenor voice. This custom was first departed from in the *Whole Book of Psalms, in Three Parts*, published in 1671, compiled and arranged by John Playford—whom sir J. Hawkins calls the "father of modern psalmody"—where we have the more proper practice, which has since obtained, of making the melody the soprano part. Croft, Courteville, Cary, the Bachs, and Handel have, since that time, contributed to the psalmody in use in Britain.

Among other metrical versions of the Psalms produced was one of doubtful origin which was attributed to James I.; and which, notwithstanding a strong recommendation by his son, was never much used in churches. The version of the Psalms by Sternhold and Hopkins came to be supplanted in England, toward the beginning of the last c., by that of Nahum Tate, poet-laureate under William III. and Anne, and Dr. Nicholas Brady, less literal in its renderings than its predecessor, and somewhat commonplace as regards poetical character. This *New Version of the Psalms* first appeared in 1698, with the royal authority allowing its use in churches. Of late years modern hymns, selected according to the taste and at the will of the incumbent, have to a large extent taken the place of metrical psalms in the church of England.

In Scotland the early reformers paid great attention to singing. In John Knox's Psalter, arranged for use in churches, the metrical psalms are set to music in harmony of four parts. Several early translations of the Psalms were produced in n. Britain, but that of Sternhold and Hopkins was used in worship from 1564 down to the middle of the 17th century. In 1632, an attempt made by Charles I. to supersede it by king James's version, was more resolutely and decidedly opposed than in England. The version now in use in Scotland was introduced during the commonwealth by the general assembly, and founded on the metrical translation of Francis Rous, a member of Cromwell's council. This new version was in 1649 appointed by the general assembly to be the only paraphrase of the Psalms sung in the kirk of Scotland. About the beginning of the 18th c., an agitation began for the enlarging of the psalmody of the kirk, by adding to it paraphrases of other portions of scripture. A collection of such paraphrases was published in 1745, and was widely used. In 1775 a committee was appointed to revise it; and in 1781 the collection which has been so long in use was sanctioned by a *permissive* act of assembly. In addition to these, separate hymn-books are now sanctioned in the established and free churches of Scotland, and have long aided in the worship of the U. P. church.

PSALMS (Heb. *Tehillim*, Songs of Praise, or *Tefilloth*, Prayers; Jerome, *Liber Hymnorum*), the well-known canonical book generally ascribed to David. The single hymns contained in the book are variously designated either as "Prayer" (Tefilla), as "Praise" (Tehillah), or from some special characteristic, "Song" (Shir), or a song of deeper meaning, (Michtam), "Instruction" (Maskil), or a dithyrambic poem (Shigayon). Respecting the general contents of the book, it may be said that it comprises, in the form of pious lyrics, written for and on behalf of the congregation, the quintessence of the dogmatical, ethical, historical, and theocratical portions of the Old Testament. The divine essence and qualities, providence and its guidance—especially of Israel—the rule of the universe, the nature of the human heart and its relations to God and his revelation, the blessings of the theocratic community: these and similar reflections form the themes of its ever-varying modes. A certain more spiritual conception of the ordinances of the Pentateuch is visible throughout, and although the strictest adherence to these is enjoined, yet their deeper meaning is impressed more strongly still. Used as a liturgical hymn-book in the temple, it has been bodily received for the same purpose in the Christian church; and certain additional hymns which occur in the Greek and Syriac Psalter have not been sanctioned by the authority of the general church. There are, in all, 150 canonical hymns or psalms, which, after the model of the Pentateuch, have been divided into five books—thus: i.—xli.; xlii.—lxxii.; lxxiii.—lxxxix.; xc.—cvi.; and cvii.—cl. The Syriac, the LXX., and the Vulgate versions differ in some respects in their counting. The authorized version, however, follows strictly the Masoretic Jewish text, except with regard to the numbering of the verses; for while the latter includes the superscriptions among the verses, the former does not reckon those. This division into five books is as it is traditional, also the most natural; and the doxologies at the ends of psalms xli., lxxii., lxxxix., and cvi., further mark authoritatively the respective ends of the special divisions. A further division, or rather classification, has been attempted according to the contents; but, considering the constantly changing variety of moods and sentiments of manner and contents which these songs exhibit, it is a most precarious one.

The Psalms have generally—thirty-four only excepted—superscriptions more or less expressive of the contents of the special hymn, and sometimes with, sometimes without, the name of an author. In some, certain notes, referring to the musical and liturgical part, are added, which are far from being quite clear now, e.g., "On the octave," "For the chief musician," "On Machalath" (illness?), "In the time of death to the son," "The hind of Aurora," "Lilies," "Dumb dove of the far ones," etc. One of the greatest puzzles is the word Selah, which occurs several times at the end, or in the middle of some psalms, and which the LXX. render Diapsalma, "Interlude," but about the real signification of which, numerous yet very unsatisfactory suggestions have been made at various times. Thus, it has been identified with amen, hallelujah, piano, etc. So much seems certain, that it was a kind of catchword or sign for the performers. These headings belong very probably to the individual poets themselves, and not to the collectors, as has been surmised.

The authorship of the Psalms is ascribed by the headings of the various chapters as follows: Psalm xc.—one of the most ancient in form and contents—is attributed to "Moses, the man of God." Seventy-three psalms are inscribed with David's name; two with Solomon's; twelve with that of Asaph, the Levite and singer, of which five, however, belong to the times of Jehoshaphat, Hezekiah, and the beginning of the Babylonian exile respectively. Eleven psalms go under the name of the sons of Korah, or the Korahites—a family of singers descended from the Levite Korah, known from the Pentateuch. Their head at the time of David was Heman. Part of these psalms belongs to the time of David; others, to that of Solomon, and others are of an uncertain later period. Respecting the psalm inscribed "Prayer of Moses," there seems, indeed, to be no valid reason against its authenticity; it is quite worthy of the great legislator, and to a certain extent similar to other compositions of which he is reasonably regarded as the author. The numerous body of psalms attributed to David, manifest (those at least which can fairly be believed to be his work) a vivid and profound feeling and rare poetical gifts. The singer abandons himself entirely to whatever feeling of joy or grief, repentance or revenge, piety or despair, sweeps over his soul. This also accounts to a certain extent for the violent manner in which he calls down at times the vengeance of God upon the heads of his adversaries; while at others, he humbles himself to the dust on account of his own iniquities. On his style and manner, we cannot enlarge here; suffice it to add, that his lyrics have deservedly been counted among the gems of all human literature for well nigh 3,000 years—quite apart from their sacred liturgical character. Asaph's psalms show their author to have been a didactic poet of high order; but, as we said before, many of those ascribed to him belong to poets later than the schism, and even posterior to the exile. The Korahite hymns, although all more or less fraught with the same depth of feeling, the same conciseness, the same grandeur and lyrical exaltation, exhibit signs of being written partly during the time of Solomon, or even during the exile. Of the anonymous psalms, some may fairly be added to the number of those that issued from the hand of the royal singer himself; others, however, belong to the post-exilian times. Some of these (the hallelujahs, for instance, or the "Songs of Degrees") were, in all probability, pilgrim-songs, chanted during the ascent to the sanctuary. Whether other psalms belong to the Maccabean period or not—a question hotly disputed—we cannot discuss here.

There is a great deal in favor of the opinion that the collection and redaction of the book, such as we have it now, is owing to one man, who arranged the single hymns according to their contents and tendency. Thus, following all the while the law of analogy, the reductor gave the first place to David's and his contemporaries" (Asaph, Ethan, Heman) compositions. These were further classified according to the prevalent use of the peculiar divine name (Jehovistic and Elohistic), and were divided into three books—the first of which contains the Davidic Jehovistic psalms; the second, the Elohistic ones of the Korahites, of Asaph, David, Solomon, and some unknown poets: the third, the rest of Asaph's and the Korahite psalms of a mixed (Jehovah-Elohistic, or purely Jehovistic) nature. The arrangement within these larger classes was made, again, according to the inner nature and relation of these hymns to each other, and by a certain likeness in phraseology, similes, etc. Psalms i. and ii. were then prefixed, on account of their generally introductory matter and manner. The same laws have also been followed in the remaining portions of the collection.

It is difficult to fix the period of the redaction. Assuming, however, the collecting and editing to be the work of one man, he could not possibly have lived before the time of Nehemiah, even according to those who affirm the non-existence of Maccabean psalms in our canon. If, on the other hand, various single collections are assumed, out of which our present book has grown, there is no reason why some of those should not be placed at a much earlier date. We forbear to add a list of writers on the subject of psalms. Nearly all the principal authorities in biblical literature, in the Jewish, Roman, and Protestant churches, have contributed their share toward the elucidation of the Psalms; and to the individual works of the chief biblical commentators, the reader is referred for special information. Le Long, in his *Bibliotheca Sacra,* enumerates more than 500 commentators on the Psalms, and Calmet carries the number up to a thousand. Of these, some are very voluminous, that of Le Blanc filling no fewer than six folio volumes.

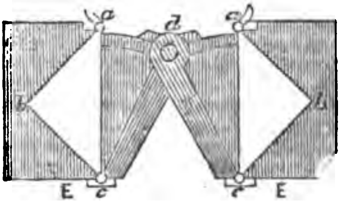
PSALTERY, a stringed instrument of music, to accompany the voice. The Hebrew *nebel* is so rendered in the authorized version wherever it is used, except in a few passages in Isaiah and in Amos, where it is translated viol. The ancient viol was a six-stringed guitar. In the prayer-book version of the Psalms the Hebrew word is rendered lute. These three instruments resemble each other, though they are different. The Greek *Psalterion* from which our word is derived, denotes an instrument played with the fingers instead of a plectrum or quill. With what instrument the nebel corresponded it is impossible to say. The psaltery of David was made of cypress, that of Solomon of the algum tree. The psaltery was one of the instruments played before Nebuchadnezzar's golden image.

PSAMMEN'ITUS or PSEMETEK. See PSAMMETICHUS, *ante.*

PSAMMETICHUS, the name of three kings of Egypt, of the 26th dynasty, distinguished on the monuments by different prenomens, and of two other persons of ancient history. The first and most notable Psammetichus was the son of Necho I. After the defeat and death of his father, he fled into Syria, and thence, by means of foreign aid, appears to have established himself as one of the twelve monarchs who then reigned over Egypt, with the rest of whom he was connected in a kind of federation. An oracle having declared that the monarchy of the whole country should go to that one who made a libation out of brass, Psammetichus fulfilled the condition by pouring it out of a brazen helmet. By the answer of another oracle, he was told that he should succeed by means of brazen men who would appear from the sea. Some Carian and Ionian pirates who appeared soon after in panoplies of brass on the shores of Egypt, answered the response of the oracle. Psammetichus engaged them in his service, and by their means finally subdued his rivals at Momemphis, after a struggle of fifteen years' duration. He strengthened his power by employing Greek mercenaries, whom he settled at Daphnon and Pelusium, to protect the eastern borders of Egypt, and whose head-quarters were subsequently transferred to Memphis. To them he assigned the right wing, or post of honor, in the army—their arms and discipline being far superior to that of the native troops. This proceeding gave great disgust to the Egyptian army, and on his refusing to send the Greeks home, after their term of service, the Elephantine garrison of 240,000 men deserted the country, and marched into Ethiopia beyond Meroë. Although exhorted, they refused to return. To protect Egypt from the Syrians, he besieged Azotus, which he finally took, after 20 years' siege. Psammetichus fostered in every way the Greek influence in Egypt, divided among them lands, encouraged the study of the language, and contracted alliances with the Athenians. He also facilitated the commerce, and opened the ports which had been hitherto closed. Under Psammetichus the arts revived, the sculpture and architecture imitated the older prototypes, and the government was remodeled on the plan of the ancient dynasties. In literature, a new handwriting, the demotic, was introduced. Egypt, however, had fallen into a national decadence, and its old polity and institutions, subverted by the foreign influence prevalent in the country, could not be restored. Psammetichus reigned, according to Manetho, 54 years; his reign closed about 609–10 B.C. The other personages of this name are of little importance.—Herodotus, ii. 154; Pliny, *Nat. Hist.* vi. 35; Diodorus, i. 67, Champollion-Figeac, *L'Egypte*, pp. 367–70; Sharpe, *Hist. Egypt*, p. 58.

PSEUDEPIG'RAPHA, "false additional writings," a large number of books and fragments which were designed by their authors to be added to the canonical books of the Old and New Testaments. While the apocryphal books, which many branches of the Christian church append to the Old Testament as at least "deutero-canonical," are valuable for various purposes and in different degrees, the pseudepigrapha, whether pretending to belong to the Old or New Testament, are as a class entirely worthless, most of them being manifest forgeries, some of ancient, and others mediæval date: of various origin, Jewish, Gnostic, and Christian. Some of those relating to the Old Testament are: *History of Antiochus; History of Asenath; Epistle of Baruch; Book of Elias; Books of Jasher and Jezirah; III., IV., and V. of Maccabees; Assumption of Moses; Preaching of Noah; Testament of the Twelve Patriarchs; Psalms of Solomon; Books of Zohar; Enoch; Jubilees; IV. of Esdras;* the Apocalypse, and vision of Esaias. Many of them are happily lost, and some are known only by name. The number of spurious books relating to New Testament times is still greater. Among them are the so-called "*Gospels,*" *of James; Matthias; Nativity of Mary; History of Joseph the Carpenter; Thomas; The Infancy; Nicodemus; Egyptians; Andrew; The Twelve Apostles; Judas Iscariot; The Manichees;* and *Marcion.* The spurious "Acts," "Epistles," and "Revelations" are very numerous. None of these various classes that are extant have any even plausible claims to canonical authority.

PSEU'DOSCOPE (*pseudos*, false, and *skopein*, to see), an optical instrument invented by prof. Wheatstone, and so called from the fact of its exhibiting objects, viewed through it, under aspects the exact converse of their natural appearance. Its construction is shown by the annexed figure: *abc*, two rectangular prisms of flint-glass, the hypothenuses of which measure 1⅜ in. in length, and 1¼ in. in depth. The prisms are hinged at *c*, so that they may be inclined toward each other in any desired degree, and are fixed each in a wooden framework, fastened together by the hinge or pivot *d*. By means of the pivot *d*, the distance between *c* and *c* may be made to accommodate itself to the different interval between the eyes in various observers. In using the instrument the eyes are placed at E and E respectively. The thumb-pieces attached to the prisms at *a* and *a* are used in adjusting the instrument for distinct vision of any particular object. The optical effect of each prism is twofold: it displaces the object, and it procures the lateral inversion of the image. From the latter circumstance, it follows that the right-hand side of a cube, for example, is seen on the left, and *vice versâ;* this inversion being occasioned by the *reflection* of the rays upon the side of the hypothenuse within each prism. By the two refractions undergone by the rays as they enter and leave the prisms, the axis of the emergent pencil is no longer directed toward the real place of the object, but is diverted in such sort that the convergence of the optic axes *diminishes* as the distance of the object *diminishes;* and *increases* as its distance *increases*—a complete reversal of the ordinary conditions of sight, and one which, in conjunction with the lateral inversion before mentioned, gives rise to very curious visual phenomena. See VISION. It is essential to the efficient use of this instrument that the object be seen by both eyes; and therefore the observer, having placed the object at the usual distance for distinct vision, should, by closing the eyes alternately, ascertain that it is within the field of each prism. He should then adjust the prisms until the two images coincide in point of space, when they will coalesce, and, at first, the object will probably retain its natural aspect; but on a sudden it undergoes a change, and the converse appearance stands out to view with the utmost distinction and reality. A hat will appear to be turned completely inside out; the interior of a basin will appear convex and protruding; and "a bust regarded in front becomes a deep hollow mask." To facilitate the illusion, the object should be equally illuminated on either side, so as to prevent shadows.—For a full account see the original paper by Wheatstone, *Phil. Trans.*, 1852, p. 11, *et seq.*



PSID'IUM. See GUAVA.

PSITTAC'IDÆ. See PARROT.

PSKOV (Ger. *Pleskaü*), a government in the n.w. of European Russia, lies s. of the governments of St. Petersburg and Novgorod. Area, 17,045 sq.m.; pop. '70, 775,701, almost all Russians, except in the western districts, where there is a small number of Finns. The climate is temperate, the surface is hilly in the w., and the soil is of average fertility. Lake Pskov and lake Ilmen receive almost all the drainage of the government, the river Velikaia falling into the former, and the Shelon, the Polista, and the Lovot into the latter. The rivers are navigable for rafts, and, nearer their mouths, for barges and ships. Lakes abound in the eastern and south-eastern districts. Agriculture is the staple employment; flax-growing being the most remunerative branch. The manufactures carried on in the government are inconsiderable. The St. Petersburg and Warsaw railway, by which ready access is afforded to the metropolitan market for the agricultural productions of Pskov, has exercised a most beneficial influence in developing the industry and resources of the government.

PSKOV, a t. in the n.w. of European Russia, capital of the government of the same name, stands on the banks of the Velikaia, 180 m. s.s.w. of St. Petersburg by railway. During the 14th and 15th centuries it made one of the confederation of the Hanse towns, and had then a population greater than at present. In 1510 it was annexed to the kingdom of Moscow. During the wars with Lithuania, Pskov was a stronghold of great importance. It contains a cathedral, 42 churches, and 4 monasteries. Fish, obtained from lake Peipus, and flax, are the principal articles of a foreign commerce which is not extensive. Pop. '67, 12,981.

PSOPHIIDÆ, a group of birds allied to the cranes, which has been ranked as a family, for the reception of the genus *psophia*, which contains five species, found in Brazil and northern parts of South America. They are represented by the *trumpeter*, which is a bird about the size of an ordinary barnyard fowl, but with long legs and neck, like other cranes. It inhabits the forests and wild uplands, never visiting fens or the borders of lakes or rivers. It walks and runs very swiftly, but rises in flight only a few feet from the ground. The name of the bird is derived from the hollow internal sound which it is said to make without opening the bill, and is attributed to the passage of air from the lungs into two large membranous bags which are attached to the windpipe as it enters the chest. See AGAMI, *ante*.

PSORA'LEA, a genus of plants of the natural order *leguminosæ*, sub-order *papilionaceæ*, having the calyx permanent after flowering, and its tube sprinkled with callous points; the legume one-seeded, sometimes ending in a beak. The flowers are blue, purple, or white. The leaves are of various forms, but in general abruptly pinnate. Some of the species are natives of India, others of other warm countries.—*P. esculenta*, the BREAD-ROOT of North America, and *prairie apple* of the Canadian boatmen, is an herbaceous perennial about a foot high, with a carrot-like root, swollen above the middle, and abounding in farinaceous matter. It is used as an article of food, both boiled and raw. In Britain it requires the protection of a frame, in order to produce an abundant crop or large roots.

PSORI'ASIS (from the Greek word *psora*, which signifies a cutaneous eruption, supposed by some to be the itch) is now employed to signify a disease characterized by slight elevations of the surface of the skin covered with whitish scales. There are various forms of this disorder, such as *P. guttata* (which is the simplest kind, and derives its specific name from the scales not coalescing, but remaining distinct, like isolated drops of water on the skin); *P. diffusa*, when the disease spreads over large portions of the skin, and often renders the patient hideous to look at, the scaly incrustations being often interspersed with bleeding cracks and fissures in all directions; *P. inveterata*, which is merely the severest phase of the preceding form, and occurs chiefly in aged persons of broken-down constitution; and *P. gyrata*, a rare form, in which the disease occurs in narrow stripes or rings. The causes of psoriasis are very obscure. It is certainly not contagious, but there appears to be in some families an hereditary tendency to it. It is occasionally associated with gout and rheumatism. Persons of both sexes, of all ages, and of all conditions of life, are liable to it, although it is more common in middle and advanced life than in childhood. The *treatment* varies with the condition of the patient. A middle-aged, vigorous patient should be purged two or three times a week with sulphate of magnesia, should be restricted in his diet to vegetables and milk, should be debarred from all stimulants, and should take a warm bath daily. The internal remedies of most repute for this disease are—1. Decoction of dulcamara, from half a pint at first to a pint being taken in divided doses through the day; 2. Liquor potassæ, in doses of from half a dram to a dram, three times a day, in a glass of milk or beer; 3. Liquor arsenicalis, in doses of from three to four minims, three times a day, to be taken after meals; 4. Iodide of potassium, in five-grain doses, three times a day; and 5. Pitch pills. In very inveterate cases, tar ointment, first diluted with lard, or a weak ointment of iodide of sulphur, should be applied locally; but these should not be tried unless internal treatment fails.

PSY'CHÉ (Gr. breath, or soul), a creation of the later mythology of Greece, or perhaps we should rather say, a personification of the human soul, devised by the later poets. Appuleius (q.v.) relates the following story about her, which is obviously allegorical. Psyché was the youngest of three daughters of a king. She was so exquisitely beautiful that mortals mistook her for Venus, and did not dare to love, but only to worship her. This excited the jealousy of the goddess, who sent Eros (Cupid) to inspire Psyché with a passion for the most contemptible of all men; but Eros was himself wounded as deeply by her glances as ever he had wounded other with his darts. Meanwhile, Psyché's father wished to see his daughter married, and inquired about her at the oracle of Apollo, by whom he was told to bear the maiden in funeral robes to the summit of a hill, and to leave her there alone, as she was destined to be the bride of a huge all-destroying snaky monster, that terrified both gods and men. Amid loud wailing and lament, Psyché was borne to the fatal spot, and left trembling in horrible solitude, when suddenly a light-winged zephyr flew round her, and bore her off to a beautiful palace of pleasure belonging to Eros, who visited her, unseen and unknown, every night, and left her before morning broke. Here Psyché would have enjoyed perpetual delight, had she remembered the advice of her unknown lover, who warned her not to seek to know who he was. But her jealous sisters, whom, against Eros's injunction, she had allowed to visit her, working upon her curiosity, persuaded her that she was embracing a monster in the darkness of night; and having lighted a lamp when Eros was asleep, she saw with rapture that she was the mistress of the most handsome of gods. In her excitement, she let a drop of hot oil fall on the sleeper's shoulder, who awoke, upbraided her for her mistrust, and vanished. Psyché gave way to the most passionate grief; she even thought of drowning herself. After wandering about for some time, she came to the palace of Venus, where she was seized by the goddess, and kept as a slave. Eros, however, who still loved her, invisibly helped and comforted the hapless maiden, reconciled her to his mother, and was finally united to her in immortal wedlock. All critics have agreed to consider the story an allegory of the progress of the human soul through earthly passion and misfortune to pure celestial felicity.

PSYCHOL'OGY. See MIND, *ante;* CAUSE; CONSCIOUSNESS; EMOTION; INTELLECT; WILL; SOUL.

PTAH, or PHTHAH, an Egyptian deity, supposed to be the same as the Greek Hephaistos and the Latin Vulcan. He was worshiped chiefly at Memphis.

PTAR'MIGAN, *Lagopus*, a genus of *tetraonidæ*, differing from the true grouse (q.v.) chiefly in having the toes thickly clothed with short feathers as well as the legs (*tarsi*). Hence the name *lagopus*, a name used by Pliny, from the resemblance of the foot to that f a hare. The bill is very short, and clothed at the base with feathers. The species are natives of the northern parts of the world, and either of elevated or of strictly arctic regions. They are not polygamous, like the true grouse, nor do the males strut with erected and expanded tail. Most of the species change color very much on the approach of winter, assuming a white, or nearly white plumage, and the diversities of color have caused some confusion and difficulty concerning them. They are all much esteemed for the table. The COMMON PTARMIGAN, or GRAY PTARMIGAN (*L. vulgaris* or *L. mutus*), is a native of the most northern parts both of the old and new worlds. In Britain, it is now seldom seen much further s. than the Grampians, and occurs only on high mountains. It was formerly an inhabitant of those of Cumberland and Wales. It is not found in Ireland. It is abundant in Norway, from which great numbers are annually brought to the London market. In arctic countries the haunts of the ptarmigan are not mountain-tops, but low valleys and plains even to the sea-shore. In form and habits, it much resembles the moor-fowl (q.v.), but is rather smaller. The winter plumage is pure white, except a black band above the eye of the male, and some parts of the quill and tail feathers. The summer plumage is as beautifully adapted to the concealment of the bird from enemies, by its harmony with the general aspect of the ground, as that of winter; the male being mostly brownish-gray, with undulating lines of black; the wings, middle tail-feathers, and under parts of the body, white; the female similar, but with a prevalent yellow tinge. The plumage, however, varies very much, according to age, sex, and the season of the year. Ptarmigans seem to trust very much for safety to the facility with which they are able to elude observation, whether among the snows of winter or the lichen-covered rocks in summer, and an unaccustomed sportsman is often startled by a covey springing up close beside him, of which he had not previously observed one. The ptarmigan is capable of being tamed, and has even been found to breed in confinement. The voice of the ptarmigan is a low croaking cry. The name ptarmigan is a modification of the Gaelic name. The *rock ptarmigan*, said to occur in the n. of Scotland, and to be common in Norway, seems to be merely the common species in a particular state of plumage.—The moor-fowl (q.v.) is a species of ptarmigan.—Another is the WILLOW PTARMIGAN, or WILLOW GROUSE (*L. saliceti*), of the northern parts of the world, abundant in the arctic parts of America, and in Norway, from which great numbers are brought to the London market. Its summer plumage much resembles that of the moor-fowl, but its winter plumage is white. It does not inhabit regions so cold or lofty as the common ptarmigan, but loves thickets of willow and dwarf-birch. It is found in Europe as far s. as the valleys of the Alps. In North America it is partially migratory.—There are other species in Siberia, Iceland, the Rocky mountains, the mountains of Mexico, etc.

PTERICHTHYS (Gr. wing-fish), a genus of ganoid fishes, peculiar to the beds of the old red sandstone measures. Fragments of the bony case had been found in Russia as early as 1813; in 1840 they were described as belonging to a fish to which the generic name asterolepis was given. In the same year the late Hugh Miller exhibited to the members of the British association the first specimen which gave an idea of the form of the fish, and to this Agassiz applied the generally-received name of pterichthys, from the wing-like appearance of the pectoral spines.

The head and anterior half of the body were covered with hard ganoid plates, fitting closely to each other, and forming a strong protecting case. The remainder of the trunk was flexible, and covered with small scales. The fish was furnished with a small dorsal fin, and the body terminated in a heterocercal tail; but neither of these, from their soft texture, is common in the fossil specimens. The creature was not fitted for rapid motion. The pectoral spines, which were at first erroneously supposed to be fins, were more probably used as weapons of defense, and perhaps they were also of service in assisting the pterichthys to move along the sandy bottoms on which it lived. The spines were composed of two segments, and were covered with tubercles like the trunk. Twelve species of the genus have been described.

PTEROCARPUS. See KINO, *ante*.

PTEROCLES. See GANGA.

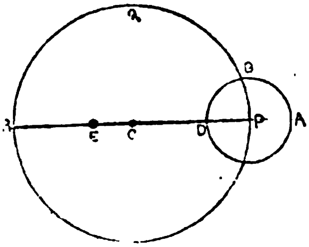
PTERODACTYL (Gr. wing-finger), a remarkable genus of fossil lizards, peculiar to the secondary strata. Its anomalous structure was long a puzzle to comparative anatomists. Blumenbach considered it a palmipede, or web-footed bird; while its original describer, Collini, and other more eminent naturalists, referred it to the mammalia, finding its nearest ally in the bat. The careful investigations of Cuvier, however, showed that the pterodactyl was a true lizard, but possessed of the power of flight, which it performed, not by a membrane stretched over its ribs, like the living dragons, but more as in the bats, except that the wing was attached, not to several, but only to a single finger—the fifth—the others being free and short. The bones of the fifth finger were very greatly elongated, and the last joint terminated in a long, slender, unguarded apex; the terminal joints in the other fingers were furnished with strong claws. Mantell thus graphically describes the genus: "With a long-snouted head and long neck much resembling that of a bird, bat-like wings, and a small trunk and tail, with lacertian affinities in its skull, teeth, and skeleton, and with a bird like structure of sternum and scapular arch, these creatures present an anomaly of structure as unlike their fossil contemporaries as the duck-billed ornithorhynchus of Australia to living mammals. The cranium is small; the jaws are long, and either armed with numerous, sharp-pointed teeth, or toothless, like those of a bird. The eye-orbit is very large: the sclerotica consists of a ring of bony plates, and the nostrils are placed near the orbits. The cervical vertebræ are large and strong, and capable of great flexibility backward and forward, probably to allow the head to fall back to the center of gravity during flight. The dorsal vertebræ are from 17 to 20 in number. The sacrum is formed by the coalescence of two vertebræ only, as in existing reptiles, and not of many, as in birds and certain extinct saurians. The tail is generally short, an unusual character with saurians; but a species with a long tail occurs at Solenhofen. There are five toes or digits on each foot; the outer finger of the forearm is immensely elongated for the support of a membranous expansion (the impression of which is preserved in some instances); and the other digits of fore and hind feet terminated in long curved claws. The size and form of the extremities show that the pterodactyl was capable of perching on trees, of hanging against perpendicular surfaces, and of standing firmly on the ground, when, with its wings folded, it might crawl on all-fours, or hop like a bird." The famous quarry of lithographic stone at Solenhofen, of upper oolite age, has supplied a great variety of these flying lizards; but the largest species have been found in the secondary beds of this country. In the upper greensand, at Cambridge, the remains of a species that must have had a spread of wing of 25 ft. across have been found; and in the Kentish chalk another has been met with very little short of this in its dimensions. The various species vary as much in structure as in form, so that the original genus has been lately raised to the position of an order, under the name of PTEROSAURIA, and the species have been arranged under the following genera, characterized principally by the structure of the jaw and teeth: *pterodactylus*, in which the jaws are furnished with long slender teeth along their whole length; *ramphorhynchus*, with the extremities of the jaws smooth, probably furnished when living with a horny bill, and toward the bases of the jaws having four or five strong teeth; and *dimorphodon*, with large strong teeth in front, and small shorter ones behind. Nearly 30 species have altogether been described.

PTER'OMYS. See FLYING SQUIRREL.

PTEROPIDÆ, a family of bats belonging to the section *frugivora*. They are commonly called *fox bats*, from the resemblance of the head to that of the fox. The ears are simple and of moderate size, and the nose is destitute of any appendages, as in many other bats. Both jaws are armed with cutting incisors, and although their principal food is fruit, they also eat insects, as well as small birds and mammals. The molars are not cuspidate, but are furnished with blunt tubercular crowns. The tail is very short, sometimes absent. The index and pollex (thumb) are generally armed with claws. The pteropidæ are among the largest of bats; the *pteropus edulis*, or kalong, sometimes measuring 5 ft. from tip to tip of wing. They are principally found in Java, Sumatra, and Borneo; also in Asia, Australia, and Africa. They are not found in America. According to Dr. Horsefield, the kalong is very abundant in the lower parts of Java, and uniformly lives in society. Numerous individuals select a large tree for their resort, and suspending themselves with the claws of their posterior extremities to the branches, often in companies of several hundreds, present a curious sight. A species of ficus (caoutchouc) is a favorite retreat, and sometimes the branches are covered with them. They pass the greater portion of the day in sleep, hanging motionless, ranged side by side with the head downward, the membrane folded and drawn about the body, and would be mistaken by a stranger for a part of the tree, or some kind of suspended fruit. In consequence of the sharpness of their claws their attachment is so strong that they cannot readily leave their hold without the assistance of the expanded membrane; and if shot while hanging, they continue suspended after death. Soon after sunset they pursue their nocturnal flight in search of food. They are very destructive to the gardens, delicate fruits, such as mangoes, jambus, lansas, etc., being devoured by them with great voracity, and it requires much care and perseverance in saving fruit. The flight of the kalong is slow and steady, pursued in a straight line, and capable of long continuance. The hunting of these bats sometimes affords amusement to the inhabitants during moonlight nights, which in Java are very serene. There are several genera and species. The species just described, *pteropus edulis*, is sometimes named *P. Javanicus*. A species with tails is *P. stramineus*, with reddish-yellow fur; expansion of wing, 2 feet. Brought from Timor and Péron by Lesueur. One genus, *cephalotes*, has a conical head, short ears, very short tail. Dental formula, $i, \frac{2-2}{3-3}; c, \frac{1-1}{1-1}; m, \frac{5-5}{4-4} = 32$. In *C. peronii* the wings spring from the middle of the back. Another genus, *harpya*, found in the Moluccas, is about the same size, with grayish fur. Another genus, *macroglossa* (F. Cuvier), resembles *pteropus*. Its character depends on the extreme length of the head, the absence of false molars, the great development of the posterior molar, and the extensile tongue. Dental formula, $i, \frac{2-2}{2-2}; c, \frac{1-1}{1-1}; m, \frac{5-5}{6-6} = 34$. *Epomophorus* of Gray, *pteropus epomophorus* of Bennett, pale brown back, belly white; total length, 6 to 7 in.; length of head, 2½ in.; expansion of wing, 12 inches.

PTEROP'ODA (Gr. wing-footed), a class of mollusks having for their only organs of locomotion wing-like fins attached to the sides of the head or neck, one to each side, by which they make their way through the water, flapping them as a bird or an insect does its wings in the air. They are allied to *gasteropoda*, but are inferior to them in organization; and their wings are not at all homologous to the *foot* of that class. They are hermaphrodite. The head is perfectly distinct in some, but obscurely distinguished from the body in others. Those which have the head most distinct, as *clio* (q.v.), have no shell, and form the order *gymnosomata;* those with the head indistinct, the order *thecosomata*, have a thin external shell, which in some is globular, with slits for the wings to pass through, in some triangular and pyramidal, in some conical, in some slipper-shaped, etc. All the species are marine; they are small and delicate creatures, very lively and active, always in quest of food, and affording food to fishes and cetaceans. They are found in all parts of the world, some of them in immense numbers in tropical, and some in arctic seas. None of them are common on the British coasts. The genera and species are few.

PTOLEMA'IC SYSTEM of astronomy, so called from Ptolemy (q.v.), its chief expounder, was originated, however, long before his time, and was, in fact, merely an attempt to reduce to a scientific form the common and primitive notions concerning the motions of the heavenly bodies. It was implicitly adopted by Plato, Aristotle, Hipparchus, and (with the exception of the Pythagoreans, and probably of Pythagoras himself) all the eminent physicists and philosophers of ancient times; passing from them to the Byzantines and Arabs, who, especially the latter, were the means of disseminating it through western Europe, where it continued to be the universally established doctrine till the 16th century. The primary and fundamental doctrines of this system are that the earth is the center of the universe, and that the heavenly bodies revolve round it in circles, and at a uniform rate. These notions, which are naturally suggested by the first general aspect of things, having, previous to any accurate observation, established themselves as unquestionable axioms, phenomena which were found, on closer examination, to be inconsistent with them, were explained by the introduction of additional hypotheses. The belief that the earth is the center of the universe was supported by its being in accordance with the relation of the primary elements of which the material world was supposed to be composed. Thus, earth, the most stable of the elements, held the lowest place, and supported water, the second in order; above water was placed air, and then fire, ether being supposed to extend indefinitely above the others. In or beyond the ether element were certain zones or heavens, each heaven containing an immense crystalline spherical shell, the smallest inclosing the earth and its superincumbent elements, and the larger spheres inclosing the smaller. To each of those spheres was attached a heavenly body, which, by the revolution of the crystalline, was made to move round the earth. The first or innermost sphere was that of the moon, and after it in order came those of Mercury, Venus, the Sun, Mars, Jupiter, Saturn, and the fixed stars, *eight* in all. To this system later astronomers added a *ninth* sphere, the motion of which should produce the precession of the equinoxes (q.v.), and a *tenth*, to cause the alternation of day and night. This tenth sphere, or *primum mobile*, was supposed to revolve from e. to w. in 24 hours, and to carry the others along with it in its motion; but the Ptolemaic astronomers do not venture to explain how this was done, although since the axis of motion of the *primum mobile* was that of the equator, its extremities being the poles of the heavens, while that of the ninth sphere was the axis of the ecliptic, some explanation was certainly necessary. As observations of the heavens became increased in accuracy, it was found that the heavenly motions were apparently not uniform, and this was explained as follows: The acceleration of the sun on one side, and retardation on the other side of his orbit, is only apparent, and results from the earth not being in the center of his sphere, C (see Fig.), but at E, and consequently his motion appears to be slowest at P, and quickest at R. The alternate progression and regression of the planets was accounted for by supposing them to move, not directly with their crystallines, but in a small circle, whose center was a fixed point in the crystalline, and which revolved on its axis as it was carried round with the latter; thus (fig.) the planet was carried round the small circle ABD, as that circle was carried round PQR (now supposed to represent the planetary crystalline). The planet, while in the outer portion of its small circle, would thus have a forward, and in the inner portion a backward motion. The larger circle was called an *eccentric*, and the smaller an *epicycle*. This theory of eccentrics and epicycles satisfied the early astronomers; but further investigation showed its incompleteness, and in later times it was found necessary to explain newly discovered discrepancies by heaping epicycle upon epicycle, till such a complication of the system had been produced as drew from Alfonso X. of Castile, to whom the Ptolemaic system was being explained, the humorous though somewhat blasphemous remark, that "if the Deity were now to reconstruct the world, he (Alfonso) could give him a few useful hints." As soon as astronomers came to understand and test the *Copernican theory* (q.v.), the venerable and disorderly pile of hypotheses, the then representative of the Ptolemaic system, which had received the papal seal of infallibility, and had in various forms held supreme sway over the minds of men for twenty centuries, at once crumbled to atoms, and sunk into oblivion.



PTOLEMA'IS. See ACRE.

PTOLEMY, a celebrated astronomer and geographer, whose proper name is CLAUDIUS PTOLEMÆUS, was a native of Egypt, though it is uncertain whether he was born at Pelusium or Ptolemais in the Thebaid. Nothing is known of his personal history, except that he flourished in Alexandria in 139 A.D. and there is probable evidence of his having been alive in 161 A.D. The chief of his writings are: *Megalē Syntaxis tēs Astronomias*, which, to distinguish it from the next-mentioned, was probably denominated by the Arabs *megistē*, the greatest, whence was derived the name *Almagest* (Arab. article *al*, the), by which it is generally known; *Tetrabiblos Syntaxis*, with which is combined another work, called *Karpos* or *Centiloquium*, from its containing a hundred aphorisms, both works treating of astrological subjects, and held by some on this account to be of doubtful genuineness; *Phaseis aplanōn asterōn kai synagōgē episēmaseiōn*, a treatise on the phenomena of the fixed stars, or a species of almanac; the *Geōgraphikē Hyphēgēsis*, his great geographical work, in eight books. The rest of his works are of inferior importance, and consist of descriptions of various kinds of projections (q.v.), the theory of the musical scale, chronological and metaphysical treatises, and a summary of the hypotheses employed in his great work, the *Almagest*. Others of Ptolemy's works have been lost, and it is still a moot-point whether or not they contained a treatise on optics, as a Latin version of what is said to have been an Arabic translation of Ptolemy's original treatise on that subject is still in existence.

Ptolemy, both as an astronomer and geographer, held supreme sway over the minds of almost all the scientific men from his own time down till about the 15th c.; but, and in astronomy specially, he seems to have been not so much an independent investigator as a corrector and improver of the work of his predecessors. In astronomy he had the labors of Hipparchus to guide him; and, indeed, scrupulously distinguishes between Hipparchus's labors and his own. To Ptolemy belongs the invention of a planetary theory, the discovery of the moon's evection (q.v.), and the singular distinction of being the sole existing authority on the subject of ancient astronomy. From this last-mentioned fact, the system of astronomy which he sets forth in the *Almagest* received his name; and, as the *Ptolemaic system* (q.v.), obtained the homage of succeeding generations till the time of Copernicus. His great work, the *Almagest*, is divided into 13 books. Ptolemy seems to have been little of an independent observer, trusting implicitly to his predecessor, Hipparchus; but his geometrical powers were of a very high order, unless, as Delambre suggests, but with little probability, the elegant demonstrations here and there occurring in the *Almagest* were borrowed from other sources.

As a geographer, Ptolemy occupies a similar position to what he holds in astronomy; he appears before his readers as the corrector and improver of the works of a predecessor, Marinus of Tyre, about whom, except from Ptolemy's writings, little is known. Ptolemy here appears to more advantage as an independent investigator, and his improvements and suggestions are at once more valuable and correct; but it is sometimes difficult to separate his data from those of Marinus. His geography is divided into eight books, all of which, with the exception of the first, eighth, and a portion of the seventh, are nothing more than a catalogue of places, with their latitude and longitude (to 12ths of a degree), with a brief general description prefixed to each continent and country or tribe, and interspersed here and there with remarks of a miscellaneous character on any point of interest. The rest of the work contains details regarding his mode of noting the positions of places—by latitude (*mēkos*) and longitude (*platos*)—with the calculation of the size of the sphere of the earth, and of the extent of surface then known. He also describes the mode adopted by him of projecting the surface of a hemisphere on a flat surface, and shows its superiority over the projections of Eratosthenes, Hipparchus, and Marinus. He also constructed a series of twenty-six maps, together with a general map of the world, in illustration of his work.

The *Almagest* and the *Geography* were the standard text-books to succeeding ages, the first till the time of Copernicus, the second till the great maritime discoveries of the 15th c. showed its deficiencies. They have passed through numerous editions, the best of which are, for the *Almagest* and the most of Ptolemy's minor works, that by Halma (Paris, 1813–16–19–20, quarto); and for the *Geography*, the Latin versions of 1482 and 1490, published at Rome, the *editio princeps* of the Greek text by Erasmus (Basel, 1533, 4to), and the Elzevir edition (Lugd. Bat. 1619, fol.). The catalogue of stars has been frequently reprinted separately, the last and best edition being that of Francis Baily, in vol. xiii. of the *Memoirs of the Royal Astronomical Society* (London, 1843).

PTOL'EMY I., son of Lagus, is also known by his surname SOTER, or the preserver. He was believed by some to be the son of Philip of Macedon, because his mother, Arsinoë, had been a concubine of that king, his father being a Macedonian of humble station. Ptolemy acted as one of Alexander's generals in his eastern campaigns; and when the possessions of the great conqueror were divided, after his death at Babylon, 323 B.C., Egypt fell to the lot of the son of Lagus. Troubles soon followed such an acquisition; but Ptolemy was a man of energy and valor, and not only warded off danger from his own realm, but also extended his dominions by the addition of Phenicia and Cœle-Syria, capturing Jerusalem, too (most probably in this expedition), by assaulting it on the Sabbath day. In 316 B.C., war again broke out between Ptolemy, Lysimachus, and Cassander on the one hand, and Antigonus on the other. (See these names.) It lasted till 301 B.C.; and at its conclusion Ptolemy was left in possession of almost the same territory as he ruled at its commencement, with the exception of Cyprus, which, by the naval battle off Salamis in that island (306 B.C.), was gained by Antigonus. Ptolemy, however, recovered Cyprus in 295 B.C., and it was thereafter attached to the Egyptian kingdom. After said battle of Salamis, in 306 B.C., Antigonus assumed the title of king, which example Ptolemy and the other successors of Alexander followed. In 305 B.C. Ptolemy compelled Demetrius, the valiant son of Antigonus, to raise the siege of Rhodes, for which deliverance the Rhodians were so grateful that they worshiped him as a deity, and conferred on him the title of *soter*, or preserver. The latter part of his reign was peace. He governed his kingdom with an enlightened and vigorous policy, and so laid the foundation of that prosperity which Egypt enjoyed for many succeeding generations. He encouraged commerce, and soon made Alexandria the great mart of the Mediterranean. He fostered literature, science, and art; and not only founded the famous museum and library of Alexandria, but also entertained at his court the votaries of the muses; Euclid, the geometrician; Stilpo, the philosopher; Philetas, the elegiac poet; Zenodotus, the grammarian; Antiphilus and Apelles, the painters; with many others. The history of Alexander's wars, by Ptolemy, is the basis of Arrian's work on the same subject. Two years before his death, which occurred in 283 B.C., he abdicated in favor of his son, Ptolemy Philadelphus. His reign extended from 323 to 285 B.C.

PTOLEMY II., surnamed PHILADELPHUS, was the son of Ptolemy I. and Berenice. He was born, 309 B.C., in the island of Cos. His reign is remarkable rather for the successful cultivation of the arts of peace than of the practice of war. Excepting a contest with his half-brother, Magas, for the province of Cyrene, his wars against Syria are almost the only military exploits which interfered with the prosecution of those designs, for the improvement of his kingdom, which have rendered his name famous among wise and enlightened sovereigns. He carried on, with even increased zeal, the good work which his father had begun. He enriched the library of Alexandria with all the literary treasures of his own and of earlier times, and the museum was crowded with the learned from all countries—with such men as Theocritus and Philetas, the poets; Euclid, the geometrician; Aristarchus and Aratus, the astronomers; Theodorus and Hegesias, the philosophers; and many more. Tradition alleges that it was by his orders the Hebrew Scriptures were translated into Greek, and the version called the "Septuagint" (q.v.) thus formed. He induced Manetho to write, in Greek, a political history of Egypt, and an account of the religious tenets of the Egyptians. He encouraged the study of natural history; and to facilitate the pursuits of those who devoted themselves to it, he formed a collection of rare and curious animals in the preserves, which we may call the "royal zoological gardens" of Egypt. He founded many colonies in those parts of his empire which seemed specially suited to become centers of trade and of enlightenment, and thus spread more widely the seeds of civilization and Greek culture; among these was Ptolemais (Acre), in Palestine. He ruled over Egypt, Phœnicia, and Cœle-Syria, Lycia, Caria, Cyprus, and the Cyclades, with parts of Arabia, Libya, and Ethiopia. His son Ptolemy married Berenice, the daughter of Magas, and the province of Cyrene was thus peacefully brought back to his empire. Under Ptolemy Philadelphus, Egypt rose to a high rank among the nations in power and in wealth. The surname of Philadelphus was assumed by Ptolemy to indicate his great affection for his sister Arsinoë, whom he married after the death of her husband, Lysimachus. His former wife, Arsinoë, daughter of Lysimachus, was banished by him, and two of his brothers were put to death. It is with reference to this last circumstance that some have explained the name Philadelphus, as in irony. By his first wife he had two sons, Ptolemy, his successor, and Lysimachus; and one daughter, Berenice, married to Antiochus II., king of Syria. He reigned from 285 to 247 B.C.

PTOLEMY III., surnamed EUERGETES, succeeded his father Philadelphus, and reigned from 247 to 222 B.C. He made war on the kingdom of Syria, to avenge the death of his sister Berenice, who had been murdered at the instigation of Laodice, former wife of Antiochus. He overran all the provinces as far s. as Babylon and Susa; those on the n. and e. as far as Bactria and India offered him homage; and he might have extended the bounds of his empire much further, had not domestic troubles compelled him to hasten back to Egypt. The treasures he brought with him were immense; and among the things most highly prized were the statues of the Egyptian gods which Cambyses had carried off to Babylon in 525 B.C. It was the restoration of these to their proper temples which gained for Ptolemy III. the title of Euergetes (the benefactor). His fleets gained many possessions on the coast of the Mediterranean, such as Pamphylia, Cilicia, and Ionia, which remained for a long time subject to Egypt, though the eastern provinces recently conquered soon returned to their former sovereign. He pushed the limits of the home-empire further s., by conquering part of Ethiopia, where he formed a colony and center of trade at Adule. Ptolemy III., like his predecessors, patronized learned men, and encouraged the study of the arts and sciences. He added so largely to the library of Alexandria that he has by some been called its founder. Among the celebrated men who adorned his court, and kept up the fame of the "museum," were Apollonius Rhodius, Eratosthenes, and Aristophanes, the grammarian. In his reign, the Egyptian kingdom reached the highest point of military glory, prosperity, and wealth.

PTOLEMY IV., surnamed PHILOPATOR, reigned from 222 to 205 B.C. He was the unworthy son of the preceding king. His reign began in blood by the murder of his mother Berenice, his brother Magas, and his uncle Lysimachus; and it ended in blood by the violent death of his wife Arsinoë. He abandoned himself to debauchery, and intrusted the management of his kingdom to favorites. Antiochus, king of Syria, profiting by his indolence, wrested from him in war some of the provinces which his father had gained; but Ptolemy IV. at length roused from his lethargy, took the field in person, and defeated Antiochus at the battle of Raphia. When peace was concluded, Ptolemy IV. returned to his capital, and plunged with increased zest into every vice and indulgence. He died in 205 B.C., his death being hastened by his excesses. He followed the example of his father and grandfather in patronizing arts and letters, and cultivated friendship with the Romans, to whom he sent large supplies of grain during the second Punic war; but persecuted the Jews, against whom he had conceived a hatred in consequence of being refused admittance to the sanctuary at Jerusalem by the high-priest.

PTOLEMY V., EPIPHANES, succeeded to the throne of his father Philopator, when only five years of age, and reigned from 205 to 181 B.C. His dominions were invaded by Antiochus, king of Syria, and Philip, king of Macedonia, while he was still an infant, and several provinces were severed from the Egyptian kingdom; but the Romans at length interfered, and peace was concluded, it being arranged that Ptolemy V. should marry Cleopatra, daughter of Antiochus, and receive as her dowry those parts of his empire in Syria which had been taken from him. He was declared of age in 196 B.C., and his coronation was performed with unusual splendor. The decree published on this occasion is that which forms the inscription on the far-famed Rosetta stone (q.v.). Ptolemy V. married Cleopatra in 193 B.C. The affairs of the kingdom were managed by the wise and virtuous Aristomenes, and so long as Ptolemy V. followed his counsels, all went well. But the king's ear was gradually opened to insinuations against his great minister, whom he ultimately compelled to drink poison. While Ptolemy V. was preparing for an expedition against Syria, he was poisoned by some of his followers, whom he had alarmed for their own safety. Under him Egypt rapidly sank in prosperity, power, and reputation.

PTOLEMY VI., PHILOMETOR, reigned from 181 to 146 B.C. He was very young at his father's death, and the affairs of the kingdom were therefore directed by his mother Cleopatra, who acted with remarkable prudence and energy. When she died in 173 B.C., the administration fell into the hands of two worthless ministers, Eulæus and Lenæus, who, engaging in war with Antiochus, brought the kingdom to the brink of ruin. The young king was taken prisoner by Antiochus (170 B.C.), who hoped to obtain possession of the whole of Egypt; but his younger brother, also called Ptolemy, immediately declared himself sovereign under the title of Euergetes II., and took vigorous measures to defend the kingdom. By the intervention of the Romans, Antiochus was compeled to return to his kingdom. The brothers reigned jointly for some time, but at length quarreled, and a civil war ensued in which Euergetes II. was ultimately worsted. The deputies of the Roman senate, who now did as they pleased in Egypt, arranged that Ptolemy Philometor should retain Egypt proper, while Euergetes II. should obtain Cyrene as a separate sovereignty. This settlement substantially held during the lifetime of the former. Ptolemy VI. reigned 35 years, and died in 146 B.C., from injuries received by a fall from his horse in a battle against the Syrian usurper Alexander Balas. He is celebrated for his mild and humane disposition, which was strikingly evinced in his magnanimous treatment of his unworthy brother.

PTOLEMY VII., or EUERGETES II., best known by the nickname PHYSCON, or *Big-belly*, ascended the throne after the death of his brother. He married his brother's sister and widow, Cleopatra (who was also his own sister), and on the same day murdered her infant son Ptolemy Eupator, whom she had at first declared king. The history of his reign is one unbroken record of murder and blood, whence his subjects nicknamed him *Kakergetes* ("the malefactor"). Not only relatives who stood in his way to the throne, but those who opposed his accession, and even innocent persons, were butchered with savage cruelty. His private vices and debaucheries were equally infamous. He divorced his wife and sister Cleopatra to marry her daughter by her first husband—his own brother; and when temporarily driven from his throne, 130–127 B.C., by the indignation of his subjects, who chose the divorced Cleopatra in his room, the monster took a diabolical revenge by murdering his own and Cleopatra's son, and sending the head and hands as a present to the latter on her birthday. One is almost ashamed to add that he retained the hereditary taste for learning, and patronized learned men. He himself wrote a work of 24 books called *Memoirs* (*Hypomnēmata*). He reigned from 146 to 117 B.C.

Besides these, there are several Ptolemies of less note—as, for example PTOLEMY VIII., or SOTOR II., otherwise called LATHYRUS or LATHURUS, who reigned first from 117 to 107 B.C., and again from 89 to 81 B.C.; also PTOLEMY IX., or ALEXANDER I., youngest son of Ptolemy VII., who reigned from 107 to 90 B.C.; PTOLEMY X., or ALEXANDER II., son of Alexander I., 81–80 B.C.; PTOLEMY XI., or DIONYSUS, or AULETES, an illegitimate son of Ptolemy Lathyrus, who reigned from 80 to 51 B.C.; PTOLEMY XII., who reigned for some time in conjunction with his sister Cleopatra, and who was ultimately drowned in the Nile, after being defeated by Cæsar; and lastly, PTOLEMY XIII., younger brother of the preceding. Cæsar appointed him joint ruler with Cleopatra, his sister and intended wife. He died by violence in 43 B.C., at the instigation of Cleopatra.

PTO'SIS (from the Gr. *pipto*, I fall) signifies a drooping or falling of the upper eyelid, and arises from palsy of the third or *motor-oculi* nerve. It may arise either from debility, in which case it may be removed by tonics; or from congestion of the brain, when it is usually accompanied with giddiness, headache, etc., and should be treated by bleeding, purgatives, and low diet; or from organic disease of the brain, in which case remedies are of little use. If it occurs without any apparent cause, and resists medical treatment, it may be removed by a surgical operation, by which the eyelid is brought under the action of the occipito-frontal muscle, which receives its nervous power from another source

PTY'CHODUS, a genus of cretaceous fish, founded on large square crushing teeth, which occur in considerable quantity in the chalk beds. The crown of the teeth are raised in the center into a number of parallel transverse ridges, and the flat margin is finely granulated. They were set, as in the Port Jackson shark, like a pavement on the borders of the mouth, and were admirably adapted to crush the shells of the crustacea and mullusca on which they fed. Large dorsal spines have been found associated with the teeth; but as no materials exist for the restoration of the external form of the fish, the analogy of their modern representative, the Port Jackson shark, alone suggests that they belonged to the ptychodus.

PU'BERTY, that period of life at which sexual development takes place. It differs somewhat among different races and nations, and is also affected by the climate, taking place rather earlier between the tropics than in the temperate zones. As a general rule the period is later in those races and in those families which are long-lived, and in consequence a more perfect development is attained. It is during this interesting period of life that the nervous system, and particularly the brain, makes its most rapid growth, attaining a greater volume in the Caucasian than in any other race. It is in accordance with all that is known in biology and physiology that a certain period is required to produce a well-developed brain, and during this time the most favorable circumstances ought to attend the development, for on them depends a happy or an unhappy life, or good or bad health. There is such a wonderful tide of vitality coursing through the veins and along the nerves during these years of adolescence that under good training a fair constitution may be formed upon a defective organization; but if the subject is exposed to degenerating influences of any kind, either from vicious personal habits, or errors in diet and exercise, or exposure to malarious and poisonous atmosphere, the inheritance of the most splendid organization may be completely squandered. Too long confinement in the vitiated air of our crowded school-rooms, and to a too uniform sitting posture, it may be feared, has worked, and is working, more mischief than many who take pride in the handsome buildings and the order which reigns within them are willing to admit. Those nations who have attained a general condition of good physical and intellectual development have paid great attention to the training of their youth and maidens, but the subject has never been well enough understood.

PUBLICA'NI (from Lat. *publicum*, that which is public or belongs to the state), the name given by the Romans to those persons who farmed the public revenues (*vectigalia*). These revenues were put up to auction by the censors, and were "sold" for a period of 5 years. They were derived chiefly from tolls, tithes, harbor-duties, *scriptura* (the tax paid for the use of public pasture-lands), mining and salt duties. As the state required the publicani to give security for the sum at which they had purchased the collecting of the taxes, and as this sum was usually much greater than the wealth of any single individual, companies (*societates*) were formed, the members of which took each so many shares, and were thus enabled to carry on conjointly undertakings far beyond the capabilities of the separate shareholders. Their contract with the Roman government was made in the name of a single person, who was called *manceps*, and who was held responsible for his *socii* to the state. Every *societas* had also a head-manager (*magister*), who resided at Rome, and transacted all foreign correspondence with the inferior officers who directly superintended the collection of the taxes. In general, a societas farmed only one branch of the revenue, but exceptions occur. Only Roman citizens were eligible as publicani, and, as a matter of course, only the wealthiest among these could become such. After the middle of the 2d c. B.C., the farming of the public revenues fell into the hands chiefly of the Equites (q.v.). By a wise regulation, no governor of a Roman province was allowed, during the period of his governorship, to have anything to do with these tax-gathering companies. The design of this was to place the governor in such a position that he could afford to act justly toward the people, who were often cruelly oppressed by the exactions of the provincial underlings—the "publicans" of the New Testament.

PUBLIC BURDENS is a phrase in Scotch law to denote the usual taxes or charges on land, in respect both of its ownership and possession. Such are the land-tax, minister's stipend, manse assessments, schoolmaster's salary, poor-rates, rogue-money, road and bridge assessments. Public burdens, where no stipulation is made to the contrary, fall upon the landlord, and not on the tenant, except in the case of schoolmaster's salary, which is equally divided between landlord and tenant.

PUBLIC DOMAIN OF THE UNITED STATES, or the lands owned by the government in trust for the people, amounted in all, including sales and grants that have been made from them to 2,912,784 sq. m., or 1,864,382,228 acres. The larger portion had not been surveyed when the government adopted the system of survey into townships 6 m. square, containing 36 "sections," each 1 m. sq., containing nominally 640 acres. Each section is subdivided by "quarter posts," midway in the side lines of the section, into quarter sections of 160 acres, in the center of the section; and these are subdivided into halves or 80 acre lots, with stakes midway in the side lines of the quarter sections. See SURVEYS OF PUBLIC LANDS. The n. and s. lines of the township are known as range lines, and the e. and w. as township lines. The cession of the claims of Virginia, New York, Connecticut, and New Hampshire to the lands w. of the original 13 states, embraced all the territory now occupied by the states n. of Georgia and e. of the Mississippi. The purchase of Florida from Spain, and of Louisiana from France, in 1800, confirmed a disputed title to all the region between the Mississippi river and the Rocky mountains, and even to the country now occupied by the states of Wisconsin and Illinois. The discoveries of capt. Robert Gray at the mouth of the Columbia river, and the explorations of capts. Lewis and Clarke under the direction of president Jefferson in 1804–5, gave the United States a claim on all the valley of the Columbia river, subsequently strengthened by a cession from Spain of her claims to the same region, and finally confirmed by a treaty with England, 1846, fixing the boundary on the Pacific slope at lat. 49°. Texas achieved independence from Mexico, and was annexed to the United States in 1845, by which a territory of 274,356 sq. m. was added to the area, most of which became public domain. The war with Mexico, which followed, resulted, in 1846, in the acquisition of California, and a considerable area of country now embraced in New Mexico and Arizona. The last acquisition, exceeded in area only by the cession of French Louisiana, is Alaska. Much the larger part of this national domain has been surveyed for sale, and marked in sections and quarter sections. The unsurveyed portions are mostly on the great plains between the Rocky mountains and the states bordering the Missouri, among the great mountain ranges, in the territories of New Mexico and Arizona, and the regions between the Rocky mountains and the Pacific. Even in these territories, wherever the land has invited settlement by its fertility, surveys have been ordered, and are constantly in progress.

The system of sales adopted by the government has varied considerably by the passage of successive acts to encourage actual settlers and give them preference over speculators. Formerly public lands could be located and bought to any extent anywhere at $1.25 per acre wherever surveys had been completed. Legislation laws known as pre-emption acts now restrict sales to actual settlers, and not exceeding 160 acres to each. All public lands to which the Indian title has been extinguished are subject to pre-emption, except those reserved by proclamation of the president for some public use; Spanish or French grants; lands occupied by, or selected for, the site of a town; land occupied for purposes of trade or business, and mineral lands. Any person who makes a settlement in person, by erecting a dwelling on any unoccupied land, and lives in it, is authorized to enter with the register of the land-office of the district his claim to such land at the minimum rate of payment required: provided, that he does not own as much as 320 acres of land elsewhere in the United States; that he does not abandon the land claimed to reside on other public land in the same state or territory; nor make more than one such pre-emptive claim; and that he has never before had the benefit of such a claim. Military bounty land-warrants, and agricultural college scrip are receivable for pre-emption payments. Lands pre-empted for homesteads are relieved from liability for former debts. Sections 16 and 36 are reserved to the state for school purposes, and if pre-empted before they are surveyed and numbered, other sections instead are assured to the state. Mineral lands (except in Michigan, Wisconsin, and Minnesota) are reserved from pre-emption and sale, except under special laws. Mining claims upon veins or lodes of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, may be made 1500 ft. in length on such vein, and not exceeding 300 ft. on each side of the vein, or less, as may be limited by miners' law, authorized by congress, and of record in the local district. "Placer claims" for mineral not in rock-in-place, are made in conformity to land surveys in squares not exceeding 160 acres; but if many locators claim within that limit, the tract is divisible into 10-acre squares, and no one locator is entitled to more than 20 acres, and no association of persons to more than 160 acres by right of location. All patents granted, or pre-emption, or homesteads allowed, are subject to any vested and accrued water-rights or rights to ditches and reservoirs used in connection with such water-rights and to rights of way for public highways. Grants of public lands to states or corporations reserve all mineral claims for location under special laws. Coal-mine lands or unsold public domains may be pre-empted, 160 acres by one individual, or 320 acres by an association, at $10 per acre if not within 15 m. of a completed railroad, and at $20 per acre if within that limit. All lands offered at public sale are sold in half-quarter sections, or 80-acre lots, to the highest bidder. Private sales are made for cash only at $1.25 per acre, unless within the lines bounding railway grants of alternate sections, which are $2.50 per acre. The president is authorized to reserve from the public lands, whether surveyed or unsurveyed, town sites on the shores of harbors, or any natural prospective centers of population. Section

2381–2394 of the revised statutes contain the provisions governing such lands. There are 39 land districts with established offices for the sale of government lands, each under the charge of a "register of the land-office" appointed by the president and confirmed by the senate; and 17 land survey districts, each with a public office under the charge of a surveyor-gen. similarly appointed. For public domain reserved for park see YELLOWSTONE PARK, etc.

PUBLIC HEALTH. See HEALTH ASSOCIATION; HEALTH, METROPOLITAN BOARD OF; HEALTH, MUNICIPAL BOARDS OF; HEALTH, NATIONAL BOARD OF; HEALTH, STATE BOARDS OF.

PUBLIC HEALTH ACT is an important act in England regulating sanitary matters (11 and 12 Vict. c. 63). It enabled local boards of health to be created all over England. The initiative was given to one-tenth of the rated inhabitants of cities, boroughs, parishes, and places having a defined boundary, to take proceedings to have the act applied to their district, whereupon and so to deal systematically with sewerage, drainage, water-supply, paving, lighting, watching. The general board of health first send an inspector to report, and afterward direct the act to apply. The act has been further supplemented by a family of kindred acts called the local government acts, the nuisances removal acts, the prevention of diseases acts, etc. The state of the law produced by these combined statutes is very complicated, but the result is greatly to extend sanitary improvements.

PUBLIC-HOUSES in England are known under two classes, viz., ale-houses, also called inns (q.v.), and beer-houses. The former give board and lodging to travelers, while the latter are mere shops for the sale of beer to be consumed on or off the premises.—1. An ale-house must be first licensed by the justices, before the keeper of it can sell excisable liquors to be consumed on the premises. The granting of the license may be opposed by any inhabitant. The justices' license, if new, must be confirmed by the confirming authority of other justices; and an excise license must follow, and not precede the justices' license. The license is in force for one year; and if any offense or misconduct is committed, the renewal of the license may be opposed, and refused on the next meeting. The statute compels the keeper to keep unadulterated liquor, to use only legal measures, not to permit drunkenness or unlawful games, or bad characters, to keep good order, and lastly, not to open his house, except to travelers, on Sundays during the morning and afternoon divine service. The law as to the opening of public-houses during Sunday may be varied by the country justices within certain narrow limits, and is as follows: No public-house can be opened for the sale of fermented or distilled liquors before half-past 12 at noon on Sunday, or in London before 1, or elsewhere before 1 if so ordered. It must be again shut between 3 and 6 P.M., and shut altogether at 11 P.M., in London, but at 10 P.M. elsewhere. Christmas-day and Good-Friday, but not public fast or thanksgiving days, are treated as Sundays. On week-days, such houses cannot be opened before 5 A.M., or after 12½ P.M., in London, and elsewhere before 6 A.M. and after 10 or 11 P.M. Travelers are expressly excepted from the above rule, and the decisions and statutes have settled the point that a traveler is a person who walks or drives 3 m. distance, whether for pleasure or on business. As regards public-houses, constables have the power of entering them to keep order, and it is an offense in the publican to refuse them admission.—2. Beer-houses are subject to the same rules as ale-houses on Sundays. They also now require to have certificates or licenses from justices, and so do all wine-house keepers and grocers who sell beer, wine, spirits, sweets, and any intoxicating liquor. All houses licensed for the first time after 1872, for consumption on the premises, must be of higher values than formerly—namely, £12 to £50.

In 1872 many of the previous statutes were modified by the intoxicating liquor licensing act, 35 and 36 Vict. c. 94, and in 1874 by 37 and 38 Vict. c. 49. The chief new features were to define the opening and closing of the houses on Sundays and week-days, and to allow country justices to vary these hours a little. Though travelers are still entitled at all hours to enter inns, persons are subjected to penalties for falsely pretending that they are travelers, and also for being found within licensed premises without sufficient reasons, during the hours when such houses ought by law to be closed. Any constable may enter one of these houses for cause, and demand the name and address of and persons found therein during prohibited hours, and it is an offense to give a false name and address. While the hours of opening and closing are now clearly defined, a power is given to the local justices or the metropolitan police commissioners to relax them for houses near any night-work or market. A power was also given to record convictions on the licenses, and after three convictions the keeper of the house was to forfeit his license and remain disqualified for 5 years, and even the premises themselves were to be disqualified from receiving a license for 2 years. The other chief feature was that justices were divided into two bodies for granting new licenses, one of them being a select committee to review the other, while there was no appeal allowed from the refusal to grant a license for a new inn. The justices thus had larger powers of refusal than before. The English act of 1872 applied in most respects to Ireland; and many of its provisions were made applicable to Scotland by an act passed in 1876.

In Scotland the law affecting public-houses has been considerably altered of late years, and the governing statute is now 25 and 26 Vict. c. 35. Certificates for the sale of excisable liquors must be applied for to the justices of the peace, who meet for the purpose in April and October. The justices have a discretion in particular localities as to fixing the hours of closing within certain limits. Certificates to sell wines and spirits include power to sell beer and cider also; but they may be granted for the sale of wine, porter, ale, beer, cider, and perry only; or for beer, porter, ale, cider, and perry only; so that there are three kinds of certificates, corresponding to what exists in England. The justices' certificate also must be obtained for the spirit and wine license, before application for the excise license. The justices have power, in special circumstances, to regulate the hours of closing; but the general hours of closing in all cases are as follows: the houses shall not be open for sale or drinking before 8 A.M., nor after 11 P.M., with the exception of refreshment to travelers, or to persons lodging in the premises: and the house shall not be opened for the sale of any excisable liquors, or drinking thereof, on Sunday, except for the accommodation of lodgers and travelers. Though, however, on Sundays, travelers and lodgers only are to be supplied with drink, this is only so in the case of inns and hotels; for with regard to public-houses proper, and spirit or beer-shops, these are not allowed to be open on Sundays even to travelers or lodgers. The certificate of justices is granted on the same conditions as to good order as in England. The owner of any property in the neighborhood may object to the granting or renewing of the certificate. Constables may enter at any time eating-houses, if they suspect excisable liquors are unlawfully sold there. The chief officer of police is to report to the procurator-fiscal the places where intoxicated persons are seen frequently to issue. Persons keeping shebeens, or uncertificated places where spirits or excisable liquors are sold or drunk, are punished heavily, and also the persons found drunk there may be fined 10s. The main difference between English and Scotch inns and public-houses is the shutting up these for the whole Sunday in Scotland. In both countries travelers are excepted; and the same definition will and ought to be given to that word in both countries, and there is a penalty imposed in Scotland of £5 on any person who falsely represents himself to be a traveler, so as to procure entertainment and drink in an inn; as there now is also in England, where the burden of proof that the person served is a traveler is thrown on the publican: yet, if the latter take all precautions to ask and satisfy himself on the point, English statutes have now decided that he incurs no penalty. The policy of these restrictions on the opening of inns and public-houses on Sunday has been much discussed of late years.

PUBLIC'OLA, PUBLIUS VALERIUS, a Roman consul, described by Livy and Plutarch as a magnanimous patriot. Having witnessed the suicide of Lucretia and sworn to avenge the outraged matron, he bore a chief part in expelling the Tarquins, and foiled the attempts of the family to regain the crown. After the death of his colleague Junius Brutus, having heard of the suspicions of the people that he was aiming at despotic power, he took measures to remove the apprehension. He demolished in the night a palatial edifice which he had reared, and ordered that the fasces which were carried before him as the emblem of power should be lowered when he came before the people. Stringent laws were enacted to protect the liberties of the citizens. It was decreed that convicts should have the right of appeal from the consuls to the people, and that whoever attempted to be king might be slain by any man at any time. For his services he was raised to the highest place of honor. The surname of *Publicola*, "friend of the people," was conferred upon him and his descendants forever. He was thrice elected consul. On his death, 503 B.C., he was buried at public expense, and lamented by Roman matrons for 10 months.

PUBLIC PROSECUTOR. See PROSECUTOR.

PUBLIC SCHOOLS. See SCHOOLS; NATIONAL EDUCATION, *ante;* COMMON SCHOOLS.

PUBLIUS, SYRUS, a native of Syria; brought to Rome when a boy as a slave; but his master was kind, educated him, and finally gave him his freedom. He excelled in writing mimes, which were in great vogue at Rome in the latter times of the republic. Julius Cæsar gave him the preference over all other mimographers. His works are lost, but some of his moral apothegms, which have been preserved by Seneca and other ancient writers, are remarkable for their laconic precision and justness of sense. They have been collected and printed at the end of some editions of Phædrus.

PUCCINIA, a genus of fungi, of the division *coniomycetes*, all very small and parasitic, on the leaves or stems of plants, within the tissue of which the mycelium creeps. One of the most common species, and the most important, is the CORN MILDEW (*P. graminis*), which is almost always present in corn fields, and in some years is very injurious to wheat and other cereal crops. It is pitchy brown or black, and grows in irregular lines, somewhat following the venation of the leaf, the lines sometimes confluent. The spores are supposed to find their way from the root upward, with the juices of the plant on which they vegetate, but this has not yet been proved by observation.

PUCCOON', a name applied in America to several kinds of plants or the colored juices which they yield. In the s. it is applied to *sanguinaria* (q.v.); in the s.w. to certain species of borage, as *lithospermum hirtum* (hairy puccoon), and *L. canescens* (hoary puccoon or alkanet). The yellow puccoon, otherwise called Indian dye, Indian turmeric, yellow root, orange root, and golden seal, is *hydrastis Canadensis*, a member of the crowfoot family (*ranunculaceæ*). This perennial herb is indigenous to Canada and the United States e. of the Mississippi river, growing in rich woodland; confined to the mountainous districts in the south. It has a low stem, and near the summit two heart-shaped leaves and a single greenish-white, apetalous, terminal flower, the sepals of which soon fall from the calyx, leaving numerous stamens and a cluster of twelve or more pistils, the ovaries of which form a bright crimson compound berry, resembling a raspberry or a blackberry in its crimson immature state. There is only one species in New York and westward. A decoction or a poultice of the root was used by the Indians as a stimulant-dressing to ulcers, and also as a dye. It has also been vaunted as a remedy for various affections, as intermittent fever, cancer, leucorrhœa, and ophthalmia, and recently it has been claimed to be serviceable in uterine hemorrhage and in dysmenorrhea. It is, however, not much relied upon by experienced medical practitioners.

PÜCKLER-MUSKAU, HERMANN LUDWIG HEINRICH Prince von, 1785–1871; b. Germany; educated at Leipsic, and entered the army. He traveled extensively in Europe and Asia. Among his works are *Briefe eines Verstorbenen*, 1830–31; *Tutti Frutti*, 1834; and *Aus Mehemet Ali's Reich*, 1844. He was made prince in 1822.

PUD, or POOD, a Russian weight which contains 40 Russian pounds—almost equivalent to 36 English pounds avoirdupois.

PUDDING, although a word in such common use, and so generally understood, is very difficult to define, for there are few preparations of cookery so varied. It may be considered one of the national dishes of Great Britain; in no other country is it used so extensively by all classes of the people. The plum-pudding is the glory of an English table, and is regarded as an essential on all festive occasions. Puddings are either made of dough simply boiled in a cloth or basin, and with or without other materials; or they may be made of a batter of flour, or other farinaceous material, and water, and poured into the pudding-cloth and boiled; or into a dish and baked. It is common also to make fruit and meat puddings, by rolling out dough or paste into large flat sheets, and inclosing the fruit or meat entirely in them, and then tying them up in the pudding-cloth and boiling them. These are the general characters of this dish, but the recipes for varying the details are innumerable.

PUDDING-STONE, a rock composed of water-worn pebbles, cemented together by a firm paste. It is now more generally known as conglomerate (q.v.).

PUDDLING, a process by which wells, ponds, canals, etc., are lined with clay or loam impervious to water. See EMBANKMENT.

PUEBLA, a state in s.e. Mexico, between 16° 20′ and 20° 15′ n. lat. and 97° and 99° 15′ w. long.; bounded by Vera Cruz on the n. and e., by Mexico, Tlascala, and Hidalgo on the w., by Oajaca on the s. and by Guerrero on the s.w.; 12,015 sq.m.; pop. '69, 697,788. The principal river is the Cordillera. The country belongs in great part to the Anahuac table-land, and within its bounds is the volcano Popocatepetl, the highest mountain in the republic. The chief exports are grain, fruit, sugar, cotton, silver, marble, and alabaster. There are manufactures of glass, steel, iron, and other articles. The chief towns are La Peubla, Tehuacan, and Cholula. There are many ancient ruins of great interest.

PUE'BLA, or PUEBLA DE LOS ANGELES, a city of Mexico, capital of a state of the same name, stands on a fruitful plain, 7,381 ft. above sea-level, and 76 m. e.s.e. of the City of Mexico. In the vicinity are Orizaba, Popocatepetl, and other lofty mountains. It was founded in 1531, and is one or the most populous, as well as one of the most industrious cities in the empire. Its streets are regular, broad, and well paved. The houses, which are frequently three stories in height, are flat-roofed, covered with variously colored tiles, and profusely ornamented, both inside and out, with fantastic paintings resembling frescos. There are 44 fountains, and the water is supplied by means of an aqueduct. It contains 72 churches, 9 monasteries, 11 convents, and 23 theological colleges. On the great square stands the cathedral, an imposing building, the interior of which is decorated in the most sumptuous manner with ornaments of gold and silver, paintings, statues, etc. Among the numerous educational institutions, there are several of the highest class. There are also hospitals, the government and the bishop's palaces, charity schools, and other benevolent institutions. The more wealthy inhabitants are accomplished, refined, and benevolent; but the lower classes are esteemed the most demoralized in the empire. Glass, earthenware, soap, woolen fabrics, and sword-blades are manufactured. Pop. 70,000. After a siege of three months, Puebla surrendered temporarily to the French in May, 1863. See MEXICO.

PUEBLO, a co. in s.e. central Colorado, drained by the Arkansas, Greenhorn, and Huerfano rivers, and Squirrel and Fontaine qui Bouille creeks; traversed by the Atchison, Topeka, and Santa Fé and the Denver and Rio Grande railroads; about 2,200 sq.m.; pop. '80, 7,615—6,718 of American birth. The surface is hilly. The soil is fertile. The principal productions are corn, wheat, oats, and live stock. Co. seat, Pueblo.

PUEBLO INDIANS, the name given by the Spaniards and afterward by the Americans to a number of Indian tribes living in villages (*pueblos*) in the present New Mexico. They were composed of a number of tribes speaking different languages. The existing tribes are Jemes, Queres, Toltos, Teguas, and Zuñis. They number about 7,000 persons. The Mexican government recognized them as citizens, and in 1857 it was decided that they were citizens of the United States; but they are not allowed to vote by the statutes of New Mexico. They live in 19 pueblos, each of which has its elective governor and a court composed of three old men. They live in houses of adobe, sun-dried brick, or stone, each containing several families. They are Roman Catholics, and several schools are supported among them.

PUERPERAL FEVER is the most fatal disease to which women in childbed are liable. It has been described under various other names than that which is now assigned to it—as *childbed fever*, *peritoneal fever*, etc. A careful investigation of the records of more than two centuries shows that the disease prevails epidemically, and that it is more virulent in lying-in hospitals than in private practice. The essential nature of the disease is a subject that has led to the expression of many different opinions. The views that it is (1) *inflammation of the uterus*, (2) *inflammation of the omentum and intestines*, (3) *peritonitis, either alone or connected with erysipelas*, (4) *fever of the special nature*, (5) *disease of a putrid character*, *or* (6) *a disease of a complicated nature*, have all been advocated by physicians of high reputation; and prof. Scanzoni, one of the highest German authorities in the department of midwifery, maintains that the disease originates in an altered condition of the blood, and consists mainly in the presence of pus in that fluid. This variety of views is doubtless, in a great measure, due to the varied characteristics of different epidemics. When a disease is epidemic, it is always difficult to ascertain whether it is contgious; but in the case of puerperal fever, there is an overwhelming amount of evidence, not only that the virus can be carried by the practitioner from one parturient woman to another, but from various other morbid sources: the peculiar condition of childbirth, and possibly certain atmospheric conditions, rendering the mother peculiarly susceptible of such contagion. Numerous series of fatal cases have been traced back to the medical man or nurse having immediately before been in attendance on a case of erysipelas, of sloughing sores, of gangrene, or of typhus fever. It is the opinion of Rokitansky and others that the morbid matter acquired by the dissection of subjects not dying from this disease, may excite the disease, in a patient shortly afterward delivered by the dissector; and there is no doubt that any one who assists at the *post-mortem* examination of a puerperal patient, becomes, as it were, a focus of intense contagion. Considering the extreme severity and undoubted contagious nature of this disease, the practitioners and nurses who come in contact with it should wash their hands either with a weak solution of chlorine (which has been found of great service in destroying the contagion in the great lying-in hospital at Vienna), or in a solution of chloride of lime, as well as with soap and water. Moreover, persons much engaged in midwifery would do well not to take any part in *post-mortem* examinations, especially when the death resulted from this disease; and when of necessity they are present, they should wear a special dress for the occasion, and take every precaution as to ablution.

Puerperal fever occurs in such varied forms that numerous divisions or species of it have been suggested. The late Dr. Gooch, one of the highest authorities on this subject, divided puerperal fever into (1) the *inflammatory* and (2) the *typhoid;* while Dr. Robert Lee and Dr. Ferguson (two of the chief authorities) make four divisions.

Inflammatory puerperal fever is most commonly due to peritonitis, but may depend upon inflammation of the uterus, the ovaries, and uterine appendages, the uterine veins, etc. The ordinary symptoms, in the most common form (namely, when there is peritonitis), are rigors, followed by heat of skin, thirst, flushed face, quickened pulse, and hurried respiration. The abnormal heat of the skin soon subsides, and is followed by nausea, vomiting, pain in the region of the womb, commencing at one spot, and extending over the abdomen. This pain increases as the inflammation extends, till the patient presents the symptoms described in the article PERITONITIS. The pulse is uniformly high; the tongue coated; the urinary secretion diminished, and often passed with difficulty; while the intellectual faculties are rarely affected. Five or six days are the average duration of this disease, which may prove fatal on the first day, or may extend to 10 or 11 days. In some epidemics (as, for example, in Paris, in 1746; in Edinburgh, in 1773; and in Vienna, in 1795), none recovered. Dr. Ferguson states, that "to save two out of three may be termed good practice in an epidemic season." The treatment so closely resembles that which is required in ordinary acute peritonitis (q.v.), that it is unnecessary to enter into any details regarding it.

Typhoid or *malignant puerperal fever* may commence in various ways, but is always accompanied with fever of a low typhoid character, and with the symptoms which usually are associated with such fever. Treatment is of little or no avail, and the patient usually sinks at the end of a few days, or even hours.

PUERPERAL MANIA comprehends many forms and degrees of mental derangement. In the experience of Esquirol, these forms presented the following proportions: of 92 cases, 49 exhibited symptoms of mania; 35, those of monomania; and 8, those of dementia. The points of agreement between these widely-differing moral phenomena are, that they occur during some stage of child-bearing, and that they can be traced to physical, but not necessarily common physical causes. Insanity is developed either during pregnancy, shortly after parturition, or during nursing. Under whatever circumstances the malady may arise, it is one of exhaustion, debility, and prostration; and this is nearly equally true, whether it be characterized by depression, languor, and passiveness, or by extreme excitement and violence. The latter are the features by which it is generally recognized, and which have justified the name by which it is generally known. The similarity to ordinary frenzy is great: there is the same watchfulness, fury, incoherence, the same vitiation of the secretions, and emaciation; and the chief differences between these affections consist in puerperal insanity being invariably traceable to disturbance of the circulation, or to animal poisoning, and in the short duration of the great majority of cases. The prognosis is in fact, so favorable, recourse to seclusion in an asylum so painful, that it has been proposed to treat all such cases at home, or that a distinct hospital or sanatorium should be established exclusively for them. When it is stated that a physical cause may be detected in the puerperal condition, this must not be construed as excluding the psychical elements which enter into the production of all such affections. Thus, it was found by Macdonald, that of 66 cases, only 6 could be attributed to a purely physical origin; and that in the majority, fright, or anxiety, or anger had formed the last or principal of that series of conditions which culminated in alienation. It not merely affects feeble and hysterical females more than others, but in a marked manner those belonging to tainted families. Of 66 patients in the Bloomingdale asylum, 17 labored under a hereditary tendency to mental disease. As connected with this point, it may be mentioned that unmarried are more liable to the disease than married women, in the proportion of 11 to 2. This great disparity may partly be explained by the fact that the fallen and unfortunate are, more than any other class of females, compelled to seek shelter in those institutions from which such statistics are obtained.—Reed on *Symptoms, Causes, and Treatment of Puerperal Insanity;* Marcé, *Folie des Femmes Enceintes, des Nouvelles Accouchées et des Nourrices.*

PUERTO BELLO, a small decayed seaport t. of the United States of Colombia, on the northern shore of the isthmus of Panama, and 40 m. n. of the town of that name. It is surrounded by mountains, has an excellent harbor, is very unhealthy, and has fallen into decay since 1739, when it was stormed by admiral Vernon, during the war between England and Spain. Pop. 3,500.

PUERTO-CABELLO, or PORTO-CABELLO, a t. of Venezuela, in the province of Caracas, 78 m. w. from Caracas. It stands on an island in the Golfo Triste, separated from the mainland by a channel so narrow as to be crossed by a bridge. The situation is very unhealthy, but the harbor is safe and commodious; its imports in 1877 amounted to £1,171,522; exports, £1,535,757. Puerto-Cabello is the port of Valencia, which is about 20 m. inland. Pop. '73, 8,467.

PUERTO DE SANTA MARI'A (usually called EL PUERTO, the port), a seaport of Spain, in the modern province of Cadiz, stands at the mouth of the Guadalete, in a most fertile district, on the bay of Cadiz, 6 m. n.e. of the city of that name, and 9 m. by railway s.w. of Xeres. Suspension-bridges cross the Guadalete and the Rio de S. Pedro. The mouth of the Guadalete forms the harbor, but the bar is dangerous and much neglected. Puerto de Santa Maria, a pleasant and well-built town, resembling Cadiz in its houses, and containing only one long and handsome street, while the others are narrow and ill-paved, is the port for the shipment of Xeres wines. The wines are lodged in numerous *bodegas*, or wine-stores, lofty buildings built with thick walls and narrow windows, in order to secure an even temperature inside. This town vies with Cadiz and San Lucar as a wine-exporting place; the principal exporting houses are English or French. The bull-fights which take place here in May are among the most famous in the country. Steamers ply frequently between this town and Cadiz, and Puerto de Santa Maria supplies that city with drinking-water at a cost of several thousand pounds a year. Pop. 21,278.

PUERTO PRINCIPÉ, SANTA MARIA DE, an important inland town, in the e. of the island of Cuba, about 325 m. e.s.e of Havana, and 45 m. s.w. of its port, Las Nuevitas, with which it is connected by railway. Pop. 30,000.

PUERTO RI'CO, an island in the West Indies, belonging to Spain, is one of the Greater Antilles, and lies e. of Hayti or St. Domingo, lat. 17° 55'—18° 30' n., long. 65° 39'—67° 11' w. It is in size somewhat less than Jamaica, being fully 100 m. from e. to w., 40 m. from n. to s., and closely resembling a rectangle in shape. The island is traversed from e. to w. by a range of mountains, 1500 ft. in average height, though rising in one peak to 3,678 ft. above the sea. From the base of the mountains, rich alluvial tracts extend to the sea, and there are numerous well-wooded and abundantly watered valleys. The soil is remarkably fertile. The principal crops are sugar, coffee, and tobacco of the finest quality, and cotton remarkable for its length of fiber, tenacity, and whiteness. Cattle and sheep are extensively reared, of a quality superior to any others in the West Indies. The imports consist of cotton, woolen, linen, silk, and embroidered goods, metals, hardware, and provisions, as ale, porter, fruits, wines, etc. The exports are sugar, tobacco, coffee, cotton, molasses, rum, hides, and cattle. The chief ports are San Juan, commonly called Puerto Rico, in the n.e., Ponce in the s.w., and Mayaguez in the west. Puerto Rico is one of the coolest and healthiest places in the West Indies. Area, 3,600 sq.m.; pop. 625,000, of whom 338,000 are whites. Of the colored race, 20,000 were still slaves in 1871. The value of the annual exports is over £3,000,000; of the imports, £3,500,000. In 1875, 1,500,000 cwts. of sugar, and 200,000 cwts. of coffee were exported. The trade is mainly with Britain, but owing to duties and port charges, it is carried on in Spanish bottoms.

The frequent changes in the executive government of Puerto Rico do not appear to affect its commercial stability. The commerce of the island is almost wholly in the hands of foreigners and Spaniards from the peninsula. The preliminary act of emancipation, which came into operation at the beginning of 1871, decreased the number of slaves by 100,000. The slave-trade was already extinct; and in 1873 slavery was entirely swept away. There is a unanimous feeling against any immigration of laborers, whether Chinese, coolies, or others. A deep-sea cable now unites Puerto Rico with Europe, America, and the other Antilles; railways, irrigation, drainage, etc., are still things in embryo. It is remarkable that, notwithstanding the fertility and healthiness of Puerto Rico, the poverty of the island flora and fauna is very great; there are hardly any flowers, birds, or wild animals.

PUFF-ADDER, *Clotho arietans*, a serpent of the family *viperidæ*, having a short and broad flat head, with scales so sharply keeled as to end in a kind of spine. It is one of the most venomous and dangerous serpents of s. Africa. It attains a length of four or almost five ft., and is thick in proportion to its length, often as thick as a man's arm. Its head is very broad; its tail suddenly tapered; its color brown, checkered with dark-brown and white; a reddish band between the eyes; the under parts paler than the upper. Its movements are generally slow, but it turns very quickly if approached from behind. Its usually creeps partially immersed in the sand of the s. African deserts, its head alone being completely raised above ground. When irritated it puffs out the upper part of its body, whence its name. The puff-adder is easily killed by the oil, or even by the juice of tobacco. Its poison is used by the Bosjesmans for their arrows. S. Africa produces several other species of *clotho*, similar in their habits to the puff-adder, and almost equally dangerous.

PUFFBALL *Lycoperdon*, a Linnæan genus of *fungi*, now divided into many genera, belonging to the section *gasteromycetes*, and to the tribe *trichospermi*. They mostly grow on the ground, and are roundish, generally without a stem, at first firm and fleshy, but afterward powdery within; the powder consisting of the spores, among which are many fine filaments, loosely filling the interior of the *peridium*, or external membrane. The peridium finally bursts at the top, to allow the escape of the spores, which issue from it as very fine dust. Some of the species are common everywhere. Most of them affect rather dry soils, and some are found only in heaths and sandy soils. The most common British species is *L. gemmatum*, generally from one to two and a half in. in diameter, with a warty and mealy surface. The largest British species, the GIANT PUFFBALL (*L. giganteum*), is often many feet in circumference, and filled with a loathsome pulpy mass, when young; but in its mature state, its contents are so dry and spongy that they have often been used for staunching wounds. Their fumes, when burned, have not only the power of stupyfying bees, for which they are sometimes used, in order to the removal of the honey, but have been used as an anæsthetic instead of chloroform. The same properties belong also to other species. Some of them, in a young state, are used in some countries as food, and none of them is known to be poisonous.

PUFF-BIRD. See BARBET.

PUFFENDORF, SAMUEL, son of a Lutheran clergyman, was b. in 1632 at Chemnitz, in Saxony. He received the early part of his education at Grimma; whence he removed to the university of Leipsic. There he studied theology for several years. In 1656 he went to the university of Jena, where he seems to have devoted himself at first chiefly to mathematics, and subsequently to the study of the *Law of Nature*, as he, and others who have treated on the same subject, have termed the law which regulates the duties of men to one another, independent of the mutual obligation which is enforced by political government, or by revelation of divine will. After quitting Jena, he was appointed tutor to the son of the Swedish ambassador at Copenhagen. Soon after he had received this appointment, a rupture having taken place between Denmark and Sweden, Puffendorf was detained as a prisoner in the Danish capital. The power of his mind here showed itself in a remarkable manner. Deprived of books and of society, he threw himself vigorously into meditating on what he had formerly read in the treatise of Grotius, *De Jure Belli et Pacis*, and in the writings of Hobbes on the principles of general law. The result was the production of the *Elementa Jurisprudentiæ Universalis*—a work which was the foundation of its author's fortune. It was dedicated to the elector Palatine; and by this prince, Puffendorf was appointed to the professorship of the law of nature and nations at the university of Heidelberg. He now gave his attention to the tissue of absurdities which existed in the constitution of the Germanic empire. As was to have been expected, the work (*De Statu Reipublicæ Germanicæ*, 1667), in which he exposed the defects of the system, raised a storm of controversy. Austria was especially furious. Puffendorf had taken care to publish it under a pseudonym—that of Severinus a Mozambano, but still, to avoid the possible consequences, he accepted an invitation from Charles XI. of Sweden, in 1670, to become professor of the law of nations at Lund. During his residence there, he published the work on which his fame now principally rests, *De Jure Naturæ et Gentium*. He then removed to Stockholm, where the king of Sweden made him his historiographer, with the dignity of a counselor of state. In his official character, he published a very uninteresting history of Sweden, from the expedition of Gustavus Adolphus into Germany to the death of queen Christine. In 1688, the elector of Brandenburg invited him to Berlin to write the history of his life and reign. Puffendorf accepted the invitation, and executed the required work in 19 dreary volumes. His intention was to have returned to Stockholm, but death overtook him at Berlin in 1694. Puffendorf lacked the genius to render the subjects on which he wrote generally interesting, but his intellectual power was nevertheless very considerable, and it appears to have throughout been honestly exercised with unflagging industry.—See Jenisch's *Vita Pufendorfi* in the *Memoirs of the Academy of Stockholm*, 1802.

PUFFIN, *Fratercula*, a genus of birds of the auk (q.v.) family, *alcadæ*, having the bill shorter than the head, very much compressed, its height at the base equal to its length, the ridge of the upper mandible as high as the top of the head, both mandibles arched, and transversely grooved. The bill gives to the birds of this genus a very extraordinary appearance. They have short legs, very short tail, and short wings; their legs are placed far back, and they sit very erect, like auks and penguins, resting not merely on the foot, but on the tarsus. Notwithstanding their shortness of wing, they fly rapidly, although they seem incapable of long-sustained flights. They swim and dive admirably. The best known and most widely distributed species is the COMMON PUFFIN (*F. arctica*), a native of the arctic and northern temperate regions, breeding not only in high northern latitudes, but as far s. as the coast of England, and migrating from the colder regions in winter, when it is to be found even on the coasts of Spain and Georgia. The puffin is a little larger than a pigeon; the forehead, crown, back of the head, a collar round the neck, the back, wings, and tail are black, the other parts of the plumage white. The puffin lays only a single egg, sometimes in a rabbit burrow, but more frequently in a borough of its own, which often extends three feet, and is not unfrequently curved; sometimes in deep fissures or crevices of cliffs. Great numbers congregate together, and their chosen breeding places are crowded with them. These are mostly on unfrequented islands and headlands, where there is some depth of soil. In some of them, the ground is covered by puffins, old and young, in thousands. The eggs are sought after by fowlers, and also the young birds, the flesh of which is used for food. The Scilly isles were held in the 14th c., under the king as earl of Cornwall, by Ranulph de Blancminster, for an annual payment of 6s. 8d., or 300 puffins at Michaelmas. The puffin is also known by the name *coulterneb*, and on the e. coast of Scotland it is familiarly called *tammienorie*. Their food consists of small crustaceans and fishes. Other species are found in different parts of the world; one in Kamtchatka, the Kurile islands, etc., with two silky tufts of long feathers on its head.—The name puffin is given in France to the *shearwaters* (q.v.), or *puffin petrels*, the genus *puffinus* of some ornithologists.

PUG, or **PUG-DOG**, a kind of dog much like the bull-dog in form, and in particular, in its much abreviated muzzle. The nose is often a little turned up. The disposition is, however, extremely unlike that of the bull-dog, being characterized by great timidity and gentleness. Pug-dogs are only kept as pets. They are often very affectionate and good-natured, bearing without resentment the roughest handling to which children can subject them. They are all of small size. The common English pug is usually yellowish with a black snout, the tail firmly curled over the back. New breeds have of late been introduced from China and Japan, interesting from their peculiar appearance, gentleness, and docility, with extremely short *puggish* muzzle; the Chinese breed very small, with smooth hair; the Japanese rather larger, with an exuberance of long soft hair and a very bushy tail.

PUGATCHEFF, YEMELYAN, 1726–75; b. Russia; fought against the Prussians in the seven years' war, and in the campaign against Turkey in 1769. On his return he was put in prison for alleged revolutionary attempts. In personal appearance he very much resembled Peter III., and on his release he pretended to be that sovereign, and declared his purpose of reasserting his right to the crown and of dethroning Catharine II. He issued a proclamation in the name of Peter III. in 1773, and the same year the rebellion began. He succeeded in capturing the fortress of Yaitzkoi, attached to his cause the Raskolniks, whose religion he embraced, and won over several Finnish and Tartar tribes, and a large number of the peasantry. After the capture of many fortresses on the Ural and the Don, he marched against Moscow, but was sold by some of his companions for 100,000 rubles. His insurrection is said to have cost 100,000 lives.

PUGET, PIERRE, 1622–94; b. France; in youth a wood-carver on decorated ships; at 17 went to Italy, became a painter and attracted attention in Rome, but in 1643 was in Marseilles carving on ships the sculptured figures that adorned the high poops of the war-ships of those days. In 1652 he went to Rome with a priest commissioned to do some important architectural work for Anne of Austria, and took up the study of architecture. Returning to Marseilles in 1656, he designed a portal for the hotel de ville at Toulon, which established his reputation both as architect and sculptor—the caryatides exhibiting an originality and power that won him the *sobriquet* of the Michael Angelo of

France. He was soon after employed in Paris, on the new châteaux of France, and in Genoa, where he designed several churches and palaces adorned with sculpture. One of these, the "Hercule Gaulois," is now in the Louvre. He was summoned to Paris by Colbert in 1668 to be made director of naval decorations of frigates building at Toulon, which he so loaded with wooden sculptures that the naval officers complained that their comfort and the ships' service were impaired by them. When done with these, he returned to execute large architectural works at Marseilles, and then went to Paris, where he died. A special hall in the Louvre is devoted to his sculptural works, among which are the "Milon de Crotone," and "Hercule au Repos."

PU'GET SOUND, a collection of inlets on the north-western border of Washington territory, forming the southern termination of Admiralty inlet, which communicates with the Pacific by the strait of St. Juan de Fuca, s.e. of Vancouver's island. It forms a sheltered bay and harbor of about 15 sq.m., surrounded by a fertile, well-timbered country.

PUGGING, a coarse kind of plaster laid on deafening-boards between the joists of floors, to prevent sound.

PUGH, GEORGE ELLIS, 1822–76; b. Ohio; educated at Miami university, where he graduated in 1840. He was a capt. of volunteers in the Mexican war, served in the state legislature, was city solicitor of Cincinnati in 1850, attorney-general of Ohio in 1851, and was elected U. S. senator in 1855.

PUGHE, WILLIAM OWEN, 1759–1835; b. Wales; went to London at the age of 17; applied himself to the study of Welsh literature; assisted Owen Jones in editing Welsh poems. These two, in 1801, associating Edward Williams, another Welshman, with them, published the *Myvyrian Archæology of Wales.* Pughe published, 1793–1803, *The Welsh and English Dictionary*, prefaced by a Welsh grammar, containing 100,000 words; *The Cambrian Biography* in 1803; edited the Welsh magazine *Y Greal*, and translated into Welsh Milton's *Paradise Lost*, bishop Heber's *Palestine*, and other English poems. His name was originally simply William Owen.

PUGILISM, or BOXING, is the art of defending one's self or attacking others with the weapons which nature has bestowed—viz., fists and arms. The origin of boxing, or the use of the fists, is likely as old as man himself. We find numerous allusions to it in the classic authors. Pollux, the twin-brother of Castor in the heathen mythology, was reckoned the first who obtained distinction by the use of his fists, conquering all who opposed him, and obtaining, with Hercules, a place among the gods for his sparring talents. The ancients were not, however, satisfied with the use of the weapons of nature, but increased their power by the addition of the cestus (q.v.). With the ancients, pugilism was considered an essential part in the education of youth, and formed part of the course of training practiced in their gymnasia; it was valued as a means of strengthening the body and banishing fear; but it was practiced in public rather with a view to the exhibition of the power of endurance than for mere skillful self-defense. The earliest account we have of systematic British boxing is in 1740, when public exhibitions of professors of the art attracted general attention. Up to this period, the science of self-defense had made but little progress, and strength and endurance constituted the only recommendations of the practitioners at Smithfield, Moorfield, and Southwark fair, which had long had booths and rings for the display of boxing. Broughton, who occupied the position of "champion of England," built a theater in Hanway street, Oxford street, in 1740, for the display of boxing; advertisements were issued announcing a succession of battles between first-rate pugilists, who never quitted the stage till one or other was defeated, the reward of each man being dependent upon, and proportioned to, the receipts. Broughton was for 18 years champion of England, and with him commences the first scientific era of pugilism. He propounded some rules for the regulation of the ring, and these remained in authority till 1838, when they were materially altered. Rule 1 is, that a square of a yard be chalked in the middle of a stage, and that in every fresh set-to after a fall, the seconds are to bring their men to the side of the square, and to place them opposite each other, and until this is done, it is not lawful for one to strike the other. Rule 2, that if either of the combatants is unable to be brought up to the square within 30 seconds after a fall and the close of a round, he shall be deemed a beaten man. No man is permitted to hit his adversary when he is down, or to seize him by the breeches, or below the waist, and a man on his knees is to be reckoned down. These rules laid the foundation of fair play, and robbed boxing of half its horrors. To Broughton also is due the introduction of gloves for "sparring-matches," where lessons could be taken without injury. The greatest professor of the art was Jackson, who was champion in 1795. He was not only the most scientific boxer of his day, but he gave his art such a prestige and popularity that half the men of rank and fashion of the period were proud to call themselves his pupils. He opened rooms for the practice of boxing in Bond street, and for years these were crowded by men of note. His "principles of pugilism" were, that contempt of danger and confidence in one's self were the first and best qualities of a pugilist; that in hitting, you must judge well your distances, for a blow delivered at all out of range, was like a spent shot, and valueless; that men should fight with their legs, using all possible agility, as well as with their hands; and that all stiffness of style and position was wrong. Jackson is still regarded as the best theorist on the "noble art," and since his time, it has received no essential improvement. Shaw, the life-guardsman, who immortalized himself at Waterloo, was a pupil of his, and the prowess which he so brilliantly displayed on that occasion, was owing as much to his scientific training as to his great strength. At this period, pugilism was actively supported by many persons of high rank—the dukes of York and Clarence, the earls of Albemarle, Sefton, etc., lords Byron, Craven, Pomfret. In 1814, when the allied sovereigns were in England, among other entertainments, a "sparring" display was provided under Jackson's management; and the distinguished foreigners expressed the great gratification they had experienced from the exhibition of so much science and fine physical development. Besides Jackson, Belcher, Gulley, and Cribb were noted champions at this period. George IV. was a stanch patron of boxing in his youth, and although he discontinued by his presence to give countenance to the sport, frequent indications were observable of his desire for its promotion. At the time of the coronation, when the popular feelings were much enlisted in behalf of queen Caroline, who was excluded from the throne, a body of pugilists were employed to preserve order; and so well did these men perform their duties, that the king presented each man with a gold medal, to commemorate the event, and to show his satisfaction. This period may be termed the "palmy days of the ring;" and from various causes, its decline has since then been uninterrupted. Among other causes, several cases occurred of prize-fighters who were tempted to lose fights on which large sums had been staked, and to deceive their most influential backers. The more distinguished patrons of the ring gradually seceded; the "pugilistic club," which had been established in 1814, and which included all the aristocratic patrons of the ring, was broken up. The magistracy of the country set their faces against the lawless assemblies of "roughs" and pickpockets who latterly formed the greater part of the spectators at prize-fights. The electric telegraph, and the establishment of an efficient rural police, have given the finishing touches to an already expiring profession. Matches can now only be got up by stealth, and the place of meeting is kept a profound secret to the last moment, for fear of interruption. A few years ago, however, the international combat between Tom Sayers, the Englishman, and John Heenan, the American, revived for a moment public interest in the art; but apart from exceptional matches, the popular feeling is that prize-fighting should not be countenanced, and we may look for its gradual extinction. The art of boxing, as an active and healthy exercise, is likely to be maintained; and the display of science between two accomplished boxers is very interesting, while it is deprived of all the horrors of the prize-ring; the rapidity of the blows, the facility with which they are mostly guarded or avoided by moving the head and arms; the trial of skill and maneuver to gain a trifling advantage in position, all give a wonderful interest to the spectator, who can watch the perfection of the art devoid of the brutalities of the ring. The pugilists of the present day are mostly publicans; their friends and the patrons of the "fancy" meet at their houses for convivial evenings, sparring-matches, ratting, and the like. It has constantly been urged in defense of pugilism that, were it abolished, the use of the knife would increase, and Englishmen would lose their present manly system of self-defense. This may be true, if the use of the fist in self-defense depended on the mercenary exhibition of pugilistic encounters, which, however, is mere assumption.—The best authority on the subject of pugilism is *Fistiana*, 1868, office of *Bell's Life*.

PUGIN, Augustin Welby Northmore, 1811–52; b. England, 1812; son of Augustus Pugin, a well-known draftsman of Normandy. In 1830 he joined the Roman Catholic church and devoted himself to reviving church architecture in England. He was an admirer of the Gothic style and advocated its general adoption. He wrote a large number of treatises on church architecture and kindred subjects; among them *An Apology for the Revival of Gothic Ornament*, *Principles of Pointed or Christian Architecture*, and *Examples of Gothic Architecture*. He was a victim of religious monomania in the latter part of his life.

PUGIN, Augustus, 1769–1832; b. Normandy; removed to London, where he was at first employed as a draftsman. He soon began to make architectural drawings for engravings, and among his first works were the buildings in Ackerman's *Microcosm of London*, 1801. He afterward studied mediæval architecture, and published, 1821–23, *Specimens of Gothic Architecture*. In 1824, in conjunction with John Britten, he published *Architectural Illustrations of the Buildings of London;* and 1825–28, *Specimens of the Architectural Antiquities of Normandy*. In this, his best work, he was assisted by his son, as also in his *Gothic Ornaments*, 1831.

PUGIN, Edwin Welby, 1834–75, b. England; son of Augustin Welby Northmore. He finished a number of his father's works, and designed many, including the Carmelite church at Kensington, and the Queenstown cathedral.

PUJOL, Abel de. See **Abel de Pujol.**

PULASKI, a co. in central Arkansas, drained by the Arkansas river, bayou Metoe and Maumelle creek, traversed by the Memphis and Little Rock, the Little Rock and Fort Smith, and the Cairo and Fulton railroads; about 900 sq.m.; pop. '70, 32,066—30,370 of American birth, 5,948 colored. The surface is level or hilly, and heavily timbered. Iron, granite, limestone, and slate are found. The soil is fertile. The principal productions are cotton, corn, and live stock. Co. seat, Little Rock.

PULASKI, a co. in s. central Georgia, drained by the Ocmulgee and Little Ocmulgee rivers, and traversed by the Brunswick and Macon railroad; 420 sq.m.; pop. '80, 14,058—14,022 of American birth, 8,234 colored. The surface is level and in great part covered with pine forests; corn, cotton, pork, and live stock are the staples. Co. seat, Hawkinsville.

PULASKI, a co. in s. Illinois, bounded on the s.e. by the Ohio river, drained also by the Cache river; traversed by the Illinois Central, and the Cairo and Vincennes railroads; about 190 sq.m., pop. '80, 9,507—9,146 of American birth. The surface is hilly, and well-wooded. The soil is fertile. The principal productions are corn, wheat, oats, and live stock. Co. seat, Mound City.

PULASKI, a co. in n.w. Indiana; drained by the Tippecanoe river, and traversed by the Pittsburg, Cincinnati and St. Louis and the Louisville, New Albany and Chicago railroads; about 450 sq.m.; pop. '80, 9,851—8,729 of American birth. The surface is mostly prairie, and there are many oak groves; corn, wheat, hay, and wool are the staples. Co. seat, Winamac.

PULASKI, a co. in e. central Kentucky; drained by the Cumberland river and its branches, and traversed by the Cincinnati Southern railroad; 750 sq.m.; pop. '80, 21,318—21,198 of American birth; 1,196 colored. Tobacco, corn, wool, oats, and honey are the chief products. Coal and other minerals of value are found. Co. seat, Somerset.

PULASKI, a co. in s. central Missouri; drained by the Gasconade river and its creeks and intersected by the Atlantic and Pacific railroad; about 500 sq.m.; pop. '80, 7,250—6,987 of American birth. The surface is hilly and the valleys fertile; corn, wheat, pork, and live stock are the staples. Limestone is found. Co. seat, Waynesville.

PULASKI, a co. in s.w. Virginia; drained by the New river, and traversed by the Atlantic, Mississippi and Ohio railroad; 350 sq.m.; pop. '80, 8,750—8,701 of American birth; 2,452 colored. The surface is mountainous; tobacco, corn, wheat, grass, and pork are the staples. Coal and lead are found. Co. seat, Newbern.

PULASKI, Casimir, 1747-79; b. Lithuania; son of the patriot count Pulaski, who organized the confederation of Barr in 1768. In the same year Casimir, who had gained military experience in the service of the duke of Courland, joined enthusiastically in the movement to liberate his country. He commanded in many battles and sieges against the Russian invaders, but in 1771 was sentenced to outlawry and death, owing to an unsuccessful attempt to secure the person of king Stanislas Augustus. He escaped to Turkey, and in 1777 arrived at Philadelphia to enter the service of the United States. He first served as a volunteer; but having won distinction at the battle of Brandywine, received from congress the appointment of commander of the cavalry with the rank of brig.-gen. After serving in that capacity for 5 months, he obtained the sanction of congress in 1778 to enter the main army at Valley Forge, for the purpose of organizing an independent corps of cavalry and light infantry. This body was called Pulaski's legion, and was ordered to South Carolina. He reached Charleston in May, 1779, and attacked the British army then before the city, but was defeated. In October of the same year Pulaski commanded the French and American cavalry at the siege of Savannah, where he was mortally wounded.

PULCI, Luigi, an Italian poet of distinguished family, was b. at Florence, Dec. 3, 1431, and devoted his life to study and to literary composition. He was one of the most intimate friends of Lorenzo de Medici and of Poliziano, from the latter of whom he derived no little assistance in the composition of his poem *Il Morgante Maggiore* (Morgante the Giant). This celebrated work, a burlesque epic (in 28 cantos), of which Roland is the hero, is a vivacious parody of the romances of Carlovingian chivalry, which had become (as Pulci thought) undeserved popularly in Italy. His mocking imagination took a pleasure in turning into ridicule the combats with giants, the feats of magicians, and all the incredible adventures that form the material basis of the mediæval epic; and he manages to do it with a wonderfully pleasant and original *naïveté*. But although the poem is essentially heroico-comic, it occasionally contains passages of the finest pathos, in which Pulci fortunately seems to forget his design of travestying the inventions of the *trouvères*, and comes out undisguisedly as a real poet. Moreover, in the midst of the most extravagant buffooneries, we come upon the truest and most natural pictures of manners—the vanity and inconstancy of women, the avarice and ambition of men. Pulci died in 1487. The *Morgante Maggiore* is one of the most valuable sources for acquiring a knowledge of the early Tuscan dialect, the niceties and idioms of which have been employed by Pulci with great skill. The first edition appeared at Florence in 1488, and has since been frequently reprinted. Other works of Pulci are a series of sonnets (often grossly indecent), *La Beca du Dicomano* (a parody of a pastoral poem by Lorenzo de Medici); *Confessione a la San Vergine*, a novel; and some letters.—Bernardo Pulci, elder brother of Luigi, wrote an elegy on the death of Simonetta, mistress of Julian de Medici; and a poem on the passion of Christ, and also executed the first translation of the *Eclogues* of Virgil.—Luca Pulci, another brother, achieved some literary reputation too by his *Giostra di Lorenzo de Medici*, a poem in honor of the success won by Lorenzo in a tournament; *Il Ciriffo Calvaneo* a metrical romance of chivalry; *Driadeo d'Anore*, a pastoral poem; and *Epistole Eroide*.

PU'LEX. See FLEA.

PULICAT', PALIKAT, or PALVELAKATU, a t. of British India, in the presidency of Madras, and district of Chingleput, 20 m. n. from Madras. It stands on an island in a large inlet of the sea or salt-water lake called the lake of Pulicat. This lake is about 37 m. in length from n. to s., and 11 m. in breadth at the widest. It contains a number of islands. The communication between the lake and the sea is by very narrow openings. The lake is much used as affording facilities of traffic by boats between Madras and more northern places. Pulicat was occupied by the Dutch in 1609, and became afterward the capital of their settlements on the Coromandel coast, but fell into the hands of the British in 1795.

PULKO'VA, a village of Russia, in the government of St. Petersburg, about 9 m. s. of the capital, contains a population of 600. It stands on a ridge called the Pulkova hills, which command a splendid view of St. Petersburg, and is noted for its magnificent observatory, built by the czar Nicholas, and placed under the direction of M. Friedrich Struve. For an interesting description of the observatory, see prof. C. Piazzi's Smyth's *Three Cities in Russia* (2 vols., Lond. 1862).

PULLEY, one of the mechanical powers (q.v.), consists of a wheel with a groove cut all round its circumference, and movable on an axis; the wheel, which is commonly called a *sheave*, is often placed inside a hollow oblong mass of wood called a *block*, and to the sides of this block the extremities of the sheave's axle are fixed for support; the cord which passes over the circumference of the sheave is called the *tackle*. Pulleys may be used either singly or in combination; in the former case, they are either *fixed* or *movable*. The *fixed pulley* (fig. 1) gives no mechanical advantage; it merely changes the direction in which a force would naturally be applied to one more convenient. The *single movable pulley*, with parallel cords, gives a mechanical advantage = 2 (fig. 1), for a little consideration will show that as the weight, W, is supported by two strings, the strain on each string is $\frac{1}{2}$W, and the strain on the one being supported by the hook A, the power, P, requires merely to support the strain on the other string, which passes round C. The fixed pulley, C, is only of service in changing the naturally upward direction of the power into a downward one. If the strings in the single movable pulley are not parallel, there is a diminution of mechanical advantage—i.e., P must be more than half of W to produce an exact counterpoise; if the angle made by the strings is 120°, P must be equal to W; and if the angle be greater than this, there is a mechanical disadvantage, or P must be greater than W. The following are examples of different combinations of pulleys, generally known as the first, second, and third systems of pulleys. In the first system, one end of each cord is fastened to a fixed support above; each cord descends, passes round a pulley (to the lowest of which the weight W is fastened), and is fastened to the block of the next pulley, with the exception of the last cord, which passes round a fixed pulley above, and is attached to the counterpoise P. The tension of a string being the same in all its parts, the tension of every part of the string marked (1) in fig. 2 is that which is produced by the weight of P, consequently, as the last movable pulley is supported on both sides by a string having a tension P, the tension applied in its support is 2P. The tension of the string is therefore 2P, and the second movable pulley is supported by a force equal to 4P. It may similarly be shown that the force applied by the strings marked (4) in support of the last pulley (which is attached to W) is 8P. Hence we see, that according to this arrangement, 1 lb. can support 4 lbs., if two movable pulleys are used; 8 lbs., if there are 3 movable pulleys; 16 lbs., if there are 4 movable pulleys; and if there are n movable pulleys, 1 lb. can support 2^n lbs. It must be noticed, however, that in practice, the weight of the cords, and of the pulleys, and the friction of the cord on the pulleys, must be allowed for; and the fact that in this system all of these resist the action of the power P, and that to a large extent, has rendered it of little use in practice.—The second system is much inferior in producing a mechanical advantage, but it is found to be much more convenient in practice, and is modified according to the purpose for which it is to be used. In this system, one string passes round all the pulleys, and as the tension in every part of it is that produced by the weight of P, the whole force applied to elevate the lower block with its attached weight, W, is the weight P multiplied by the number of strings attached to the lower block; the pulleys in the upper block being only of use in changing the direction of the pulling force. This system is the one in common use in architecture, in dockyards, and on board ship, and various modifications of it—such as White's pulley, Smeaton's pulley, etc., have been introduced; but the simpler forms have been found to answer best.—The third system is merely the first system inverted, and it is a little more powerful, besides having the weight of the pulleys to support the power,

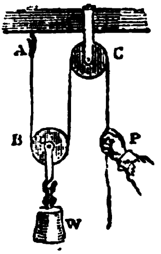


FIG. 1.

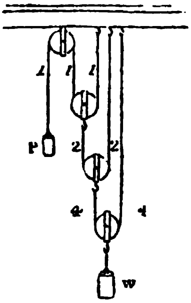


FIG. 2.

instead of acting in opposition to it, as in the former case. By this time, it will have been evident to the reader that the mechanical advantage is not produced by the pulleys, but by the strings, and that the pulleys are merely useful in keeping the strings in a certain position, changing with as little friction as possible the direction of the pull, and affording a convenient means of attaching the weight. Theoretically, the larger the number of movable pulleys in one combination, the greater is the mechanical advantage afforded; but the enormous friction produced, and the want of perfect flexibility in the ropes, prevent any great increase in the number of pulleys.

PULLMAN, JAMES MINTON, b. N. Y., 1836; graduated at the St. Lawrence divinity school in 1860; became pastor of the First Universalist church in Troy, N. Y., and in 1867 of the church of Our Savior in New York; was secretary of the general convention of Universalists in 1868; editor of the *Christian Leader* in 1869.

PULMONA'RIA. See LUNGWORT, *ante.*

PULMONA'TA, an order of gasteropodous mollusks, having, for the purpose of respiration, a vascular air-sac or lung, which opens by a hole under the margin of the mantel, capable of being contracted or dilated at pleasure. Some are terrestrial, some aquatic. Slugs and snails are familiar examples of the former; water-snails, or pond-snails (*limnæa, planorbis,* etc.), of the latter. Most of the pulmonata are protected by a shell; in some, as slugs, the shell is internal and rudimental.

PULNEY or PALNAI HILLS, a range of southern India, linking the southern extremities of the eastern and western Ghauts. The average height of this range is about 7,500 ft. above the level of the sea. It possesses peculiar advantages for the establishment of a sanitarium. The climate is one of the most equable anywhere to be found, the variation of the thermometer during 12 months in a closed room without a fire being observed to be no greater than between 58° and 62°. At present there are only a few European residences built on these hills.

PU'LO-PENANG'. See PRINCE OF WALES ISLAND.

PULP, a term employed to describe those very soft and succulent parts of plants, almost exclusively of fruits, which consist of cellular tissue with much juice. The pulp of a fruit is sometimes found in one part of it, sometimes in another; thus, in the peach, plum, and other drupes, it is the *mesocarp;* in the grape and gooseberry, it is developed from the placentas, and the seeds are embedded in it.

PULPIT (Lat. *pulpitum*), an elevated tribune or desk, from which sermons, lectures, and other solemn religious addresses are delivered. In great churches the pulpit is commonly placed against the wall, or in juxtaposition with a pillar or buttress. Originally it would appear to have been used chiefly for the singing, chanting, or recitation which form part of the public service, and was a kind of stage sufficiently large to accommodate two or even more chanters. For the convenience of the hearers, this stage began to be used by the bishop, priest, or deacon, for the delivery of the homily; and thus by degrees a tribune expressly suited to the latter use alone came to be introduced. In some of the older churches the *ambo* or *pulpitum* is still used for the chanting of the gospel and epistles. In Catholic churches the pulpit is generally distinguished by some religious emblems, especially by the crucifix; and the pulpits of the Low Countries and of Germany are often masterpieces of wood-carving, the preaching-place in some of them forming part of a great artistic group, as of the conversion of St. Paul, the vocation of Peter and Andrew, the temptation of Adam and Eve, and other similar subjects. The pulpit (in Arabic, *mimber*) forms one of the scanty appliances of Mohammedan worship.

PULQUE, a favorite beverage of the Mexicans and of the inhabitants of Central America, and some parts of South America; made from the juice of different species of *agave* (q.v.), which is collected by cutting out the flowering-stem from the midst of the leaves in the beginning of its growth, and scooping a hole for the juice. From this cavity large quantities of juice are removed daily for months. The juice is an agreeable drink when fresh, but is more generally used after fermentation, when it has a very pleasant taste, but a putrid smell, disgusting to those unaccustomed to it. Pulque is retailed in Mexico in open sheds called *pulquerias,* which also serve for dancing-rooms. When mixed with water and sugar, and allowed to ferment for a few hours, it forms a beverage called *tepache.* A kind of spirit is also prepared from it.

PULSATIL'LA. See ANEMONE, *ante.*

PULSE (Lat. *puls*), a name for the edible seeds of leguminous plants, as *corn* is the name for the edible seeds of grasses. Peas and beans are the most common and important of all kinds of pulse; next to them may be ranked kidney-beans, lentils, chick-peas, pigeon-peas, etc. *Legumine* (q.v.), a very nitrogenous principle, abounds in all kinds of pulse. Legumine forms a thick coagulum with salts of lime, wherefore all kinds of pulse remain hard if boiled in spring-water containing lime. The best kinds of pulse are very nutritious, but not easy of digestion, and very apt to produce flatulence.

PULSE (Lat. *pulsus,* a pushing or beating). The phenomenon known as the arterial pulse or arterial pulsation is due to the distention of the arteries consequent upon the intermittent injection of blood into their trunks, and the subsequent contraction which results from the elasticity of their walls. It is perceptible to the touch in all excepting very minute arteries, and in exposed positions, is visible to the eye. "This pulsation," says Dr. Carpenter, "involves an augmentation of the capacity of that portion of the artery in which it is observed; and it would seem to the touch as if this were chiefly effected by an increase of diameter. It seems fully proved, however, that the increased capacity is chiefly given by the elongation of the artery, which is lifted from its bed at each pulsation, and when previously straight, becomes curved; the impression made upon the finger by such displacement not being distinguishable from that which would result from the dilatation of the tube in diameter. A very obvious example of this upheaval is seen in the prominent temporal artery of an old person."—*Principles of Human Physiology*, 4th ed., p. 492. The number of pulsations is usually counted at the radial artery at the wrist, the advantages of that position being that the artery is very superficial at that spot, and that it is easily compressed against the bone. In some cases it is preferable to count the number of contractions of the heart itself.

The qualities which are chiefly attended to in the pulse are its frequency, its regularity, its fullness, its tension, and its force.

The *frequency* of the pulse varies greatly with the age. In the fetus *in utero* the pulsations vary from 140 to 150 in the minute; in the newly-born infant, from 130 to 140; in the 2d year, from 100 to 115; from the 7th to the 14th year, from 80 to 90; from the 14th to the 21st year, from 75 to 85; and from the 21st to the 60th year, 70 to 75. After this period the pulse is generally supposed to fall in frequency, but the most opposite assertions have been made on this subject. There are many exceptions to the preceding statement; young persons being often met with having a pulse below 60, and cases not unfrequently occurring in which the pulse habitually reached 100, or did not exceed 40 in the minute, without apparent disease. The numbers which have been given are taken from an equal number of males and females, and the pulsations taken in the sitting position. The influence of sex is very considerable, especially in adult age, the pulse of the adult female exceeding in frequency that of the male of the same age by from 10 to 14 beats in the minute. The effect of muscular exertion in raising the pulse is well known; and it has been found by Dr. Guy that posture materially influences the number of pulsations. Thus, in healthy males of the mean age of 27 years, the average frequency of the pulse was, when standing, 81, when sitting, 71, and when lying, 66, per minute; while in healthy females of the same age the averages were—standing, 91; sitting, 84; and lying, 79. During sleep the pulse is usually considerably slower than in the waking state. In disease (acute hydrocephalus, for example), the pulse may reach 150 or even 200 beats; or, on the other hand (as in apoplexy and in certain organic affections of the heart), it may be as slow as between 30 and 20.

Irregularity of the pulse is another condition requiring notice. There are two varieties of irregular pulse: in one, the motions of the artery are unequal in number and force, a few beats being from time to time more rapid and feeble than the rest; in the other variety, a pulsation is from time to time entirely left out, constituting intermission of the pulse. These varieties often concur in the same person, but they may exist independently of each other. Irregularity of the pulse is natural to some persons; in others it is the mere result of debility; but it may be caused by the most serious disorders, as by disease of the brain, or by organic disease of the heart; and hence the practical importance of ascertaining the various meanings of this symptom.

The pulse is said to be *full* when the volume of the pulsation is greater than usual, and it is called *small* or *contracted* under the opposite condition. A full pulse may depend upon general plethora, on a prolonged and forcible contraction of the left ventricle of the heart, and possibly, to a certain extent, on relaxation of the arterial coats; while a small pulse results from general deficiency of blood, from feeble action of the heart, from congestion of the venous system, or from exposure to the action of cold. When very small it is termed *thread-like*.

The *tension* of the pulse is the property by which it resists compression, and may be regarded as synonymous with *hardness*. A hard pulse can scarcely be stopped by any degree of pressure of the finger. It occurs in many forms of inflammation, and its presence is commonly regarded as one of the best indications of the necessity of venesection. A *soft* or compressible pulse is indicative of general weakness.

The *strength* of the pulse depends chiefly on the force with which the blood is driven from the heart, but partly also upon the tonicity of the artery itself and the volume of the blood. A strong pulse is correctly regarded as a sign of a vigorous state of the system; it may, however, arise from hypertrophy of the left ventricle of the heart, and remain as a persistent symptom even when the general powers are failing. As strength of the pulse usually indicates vigor, so *weakness* of the pulse indicates debility. There may, however, be cases in which weakness of the pulse may occur in association with undiminished energy of the system at large. For example, active congestion of the lungs may so far impede the passage of the blood through these organs that it cannot reach the heart in due quantity; the necessary result is a weak and feeble pulse, which will rapidly increase in strength if the congestion is relieved by free blood-lettings. Various expressive adjectives have been attached to special conditions of the pulse, into the consideration of which our space will not permit us to enter. Thus, we read of the jerking pulse, the hobbling pulse, the corded pulse, the wiry pulse, the thrilling pulse, the rebounding pulse, etc.

PUL'TE, JOSEPH HIPPOLYTE, b. Germany, 1811; studied at Berlin and Marburg; took a medical degree, and settled in Pennsylvania in 1834. He removed to Cincinnati in 1840, was professor in the Cleveland homeopathic college 1852–55, and afterward of clinical medicine in the Pulte medical college at Cincinnati. He has written a number of books which are of high authority in homeopathic medicine.

PULT'ENEY, WILLIAM, Earl of Bath, 1682–1764; b. England; educated at Westminster school and Christchurch, Oxford. After traveling on the continent he was elected to parliament for the borough of Hedon, in Yorkshire, continuing as a whig to represent that town through the whole reign of queen Anne. On the prosecution of Walpole in 1712, he defended him with great eloquence. On the accession of George I. he was appointed secretary of war under Walpole; joined the opposition in 1725, and became the bitter antagonist of the minister, succeeding by the brilliancy of his speeches and his patriotic utterances in depriving him of his place. In 1742 he was created earl of Bath; was very popular as the leader against Walpole. On the resignation of the Pelham ministry he was made premier; but, unable to form a cabinet, he held the office for only two days, and retired from public life.

PULTOWA. See POLTAVA.

PULTUSK, a t. of Poland, in the government of Lomza, is situated in a thickly-wooded district on the Narew, 35 m. n.n.e. of Warsaw. It contains numerous churches and a very large bishop's palace. Pop. '67, 7,196. Here, on Dec. 26, 1806, was fought one of the battles of the campaign of Eylau, between the Russians and the French. The field was most obstinately contested; but the victory—which, however, was claimed by both armies—inclined in favor of the French.

PU'LU, a beautiful substance, resembling fine silk, of a rich brown color and satin luster, used largely as a styptic by the medical practitioners of Holland, and introduced into this country for the same purpose. It consists of the fine hairs from the stipes of one or more species of tree-fern, referable, without doubt, to the genus *cibotium*. It was first imported into this country in 1844 from Hawaii, under the name of pulu, or vegetable silk, and was proposed as a substitute for silk in the manufacture of hats, but could not be applied. In 1856 it was again imported from Singapore under the Malay names of penghawar djambi and pakoe kidang, and was said to have been used in Dutch pharmacy for a long period as a styptic. Several importations have since taken place, and it has been successfully used. It acts mechanically by its great absorbent powers.

PULWUL, a t. of British India, in the district of Gurgaon, in the Punjab, 36 m. s. by e. from Delhi, on the route to Muttra. Pop. '68, 12,629.

PUMA, or COUGAR, *Felis concolor*, *leopardus concolor*, or *puma concolor*, one of the largest of the American *felidæ*, rivaled only by the jaguar. It is sometimes called the American lion, although it is more allied to the leopard, notwithstanding its want of spots and stripes. It is from 4 to 4½ ft. in length from the nose to the root of the tail, and the tail about 2 ft. or 2½. The fur is thick and close, reddish-brown above, lighter on the sides, and reddish-white on the belly; the muzzle, chin, throat, and insides of the legs greyish-white, the breast almost pure white. Young pumas have dark-brown spots in three rows on the back, and scattered markings elsewhere, exhibiting the relation to the leopards. The long tail of the puma is covered with thick fur, and is generally coiled up, as if it were prehensile, which it does not seem to be, although the puma climbs trees very well, and often descends on its prey from among their branches. The puma was formerly found in all except the coldest parts of America, but is now rare in most parts of North America, having been expelled by man. It rarely attacks man, but is very ready to prey on domestic animals, and seems to have a thirst for blood beyond that of other *felidæ*, one puma having been known to kill 50 sheep in a night, drinking a little of the blood of each; a very sufficient reason for the anxiety which all American farmers show for its destruction. Yet it is easily tamed, and when tamed, a very gentle creature, purring like a cat, and showing equal love of attentions. The geographical range of the puma extends far southward in Patagonia, and northward even to the state of New York, although it is now very rare in all long-settled parts of North America. It is the *painter* (panther) of North American farmers. It sometimes issues from the forests, and roams over prairies and pampas, and is not unfrequently caught by the lasso of South American hunters. A BLACK PUMA (*felis nigra* of some naturalists), a doubtful species, and probably only a variety of the common puma, is found in some parts of South America.

PUMICE, a mineral found in volcanic countries, generally with obsidian and porphyries. In chemical composition, it agrees with obsidian, of which it may be regarded as a peculiar form, rapidly cooled from a melted and boiling state. It is of a white or gray color, more rarely yellow, brown, or black; and so vesicular, that in mass it is lighter than water, and swims in it. The vesicles, or cells, are often of a much elongated shape. Pumice often exhibits more or less of a filamentous structure, and it is said to be most filamentous when silica is most abundant in its composition. It is very hard and very brittle. It is much used for polishing wood, ivory, metals, glass, slates, marble, lithographic stones, etc., and in the preparation of vellum, parchment, and some kinds of leather. Among other purposes to which it is applied is the rubbing away of corns and callosities. Great quantities are exported from the Lipari isles to Britain and all parts of Europe. The Lipari isles are in great part composed of pumice, which there, as in some other places, occurs as a rock. Pumice is the chief product of some volcanic eruptions; but in some eruptions, none is produced. It is found also in regions where there are now no active volcanoes, as at Andernach on the Rhine.

PUMPKIN. See GOURD.

PUMPS are machines for raising water and other fluids to a higher level. They are divided into several classes according to their mode of action. Of these, as the most important, we shall describe in detail the following: 1. The lift or suction-pump; 2. The lift and force-pump; 3. The chain-pump; 4. The centrifugal pump; 5. The jet-pump,

1. *The Lift or Suction-pump.*—The diagram (Fig. 1.) represents the ordinary suction-pump. A is a cylinder, which is called the barrel; with it is connected at the bottom a pipe, B, which communicates with the water to be raised; and at its top is another pipe, C, which receives the water raised. In the barrel are placed two valves, D and E. D is fixed in position at the bottom of the barrel; E is attached to and forms part of the piston F, which moves up and down the barrel when motive-power is applied to the rod G. The piston, or bucket, consists of a cylindrical piece of wood or metal, which fits exactly the barrel in which it moves, so that no water or air can pass between its circumference and the sides of the cylinder. This tight fitting is attained in wooden pistons by surrounding them with a leather ring; and in those of metal, by hemp or other packing, which is wrapped round a groove made in their outer surface. The hollow interior of the piston is closed at the top by the valve E, which is a kind of door opening on a hinge, at one side of it, in an upward direction, on the application of pressure, and shutting on to its seat on the piston when the pressure is removed. When opened, water or air can pass through it to the upper side of the piston; but when shut, none can pass from one side of the piston to the other. The other valve, D, is similar to it in all respects, except that, as before stated, it is fixed in the bottom of the barrel; it also can only open upward.

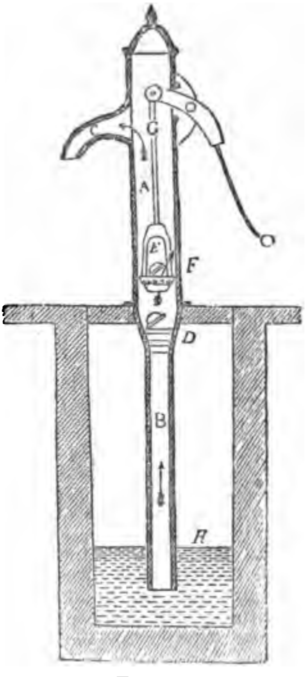


FIG. 1.

To describe the action of the pump, we shall suppose the piston to be at the bottom of the barrel, and the pump to contain nothing but air. On moving the piston up the barrel—the valve in it being shut, and kept so by the atmospheric pressure above it—no air can pass from above it into the part of the barrel from which it is moving; the air contained in which becoming rarefied, by having to occupy a greater space, exerts less pressure on the valve D at the bottom of the barrel than the air in suction-pipe B below it. This valve is thus opened, and the air from the suction-pipe enters the barrel; so that when the piston has arrived at the top, a volume of air equal to the contents of the barrel has passed from the suction-pipe into the barrel. When the piston descends, it compresses the air in the barrel, which shuts the valve D; and when the density of the compressed air becomes greater than that of the atmosphere, the valve E in the piston is forced open, and the air in the barrel passes to the upper side of the piston. The next upward stroke of the piston again draws a like quantity of air from the suction-pipe into the barrel; and, as none of this air again enters the pipe, but is passed to the upper side of the piston by its downward stroke, the suction-pipe is by degrees emptied of the air it contained. During this process, however, motion has taken place in the water at the foot of the suction-pipe. The surface of the water at H is pressed upon by the weight of the atmosphere with a pressure of about 15 lbs. on every square inch; and, by the laws of fluid pressure, if an equal pressure is not exerted on the surface of the water in the suction-pipe, the water will rise in it, until the pressure on the surface, plus the weight of its fluid column, balances the pressure of the atmosphere on the surface H outside; so that, as the air in the suction-pipe is rarefied, the water rises in it, until, when all the air is extracted from it, the water stands at the level of the valve D. By the next upward stroke of the piston, the barrel being emptied of air, the water follows the piston, and fills the barrel as it filled the suction-pipe. The pressure produced by the downward stroke shuts the valve D, and forces the water in the barrel through the valve E. The succeeding upward stroke carries this water into the pipe above, and again fills the barrel from the suction-pipe. In like manner, every successive upward stroke discharges a body of water equal to the content of the barrel into the pipe above it, and the pump will draw water as long as the action of the piston is continued.

The action of this pump may be more shortly described by saying that the piston withdraws the air from the barrel, and produces a vacuum, into which the water rushes through the suction-pipe, impelled by the pressure of the atmosphere on its surface. This atmospheric pressure balances a column of water of about 33 ft. in height; so that if the barrel be placed at a greater height than this from the surface of the water in the well, the water will not rise into it, and the pump will not draw.

With regard to its efficiency—that is to say, the relation between the power expended and the work produced, as measured by the water raised—we may remark, that the power is expended—1st, in raising the water through the required height; 2d, in overcoming the friction of the moving parts of the pump; 3d, in the friction and fluid resistance of the water in passing through the valves and pipes; 4th, in the losses arising from the want of proper proportion between the various parts of the pump. The losses arising from these last sources are very great, and vary so much according to the construction of each particular pump, that no useful estimate can be formed of the efficiency. We may say, however, that a pump of this description, to yield 50 per cent of the applied power, must be well proportioned and carefully constructed.

2. *The Lift and Force-pump.*—The ordinary forms are very similar to the suction-pump before described, with this exception, that the valve represented by E in Fig. 1, instead of being fixed on the piston, is placed in the discharge-pipe, the piston itself being solid. The water is drawn up into the barrel by suction in the manner just described in the suction-pipe, and then the pressure of the piston in its downward stroke forces it through the outlet valve to any height that may be required. Another form is provided with a different description of piston, called the plunger-pole. Its action is precisely the same as that of the other, with this exception, that the plunger-pole, instead of emptying the barrel at every stroke, merely drives out that quantity which it displaces by its volume. It is simply a solid rod of metal moving through a water-tight stuffing-box. This stuffing-box is made by placing, on a circular flange of metal, rings of india-rubber or other packing, the inner diameter of which is slightly less than that of the plunger-pole. On these is placed a ring of metal, and through the whole are passed bolts, which, on being screwed tight, force the packing tightly against the plunger-pole. It possesses many advantages, for the packing can be tightened and repaired without removal of the piston or stoppage of the pump; also, the cylinder is not worn by its action, nor does it require to be accurately bored out, as in the other form of pump.

In these pumps, it will be observed that the water is forced into the ascending pipe or column only on the downward stroke; it will thus be discharged in a series of rushes or jerks. As it is a great object to procure a continuous discharge, both for its convenience, and for the saving of the power wasted by the continual acceleration and retardation of the ascending column, various methods have been used for that purpose. The most common is the reservoir of air, which is an air-tight receptacle fixed vertically on the discharge-pipe; the water forced into the pipe by the down-stroke compresses this air, which, acting as a spring, returns this force to the ascending column during the period of the up-stroke, and so, by taking the blow of the entering water, and returning it gradually, equalizes the pressure, and renders the discharge uniform. Another method is the double-action force-pump, by which equal volumes of water are forced into the ascending column by both up and down strokes. A solid piston is worked by a rod of half the section of the piston itself. During the up-stroke, the upper surface forces a volume of water into the ascending column, and the lower surface draws in twice that volume. In the down-stroke, these two volumes are sent through a pipe into a receptacle, communicating with the upper face of the piston. One of the volumes fills the space between the piston rod and the cylinder which would otherwise be left empty by the descent of the piston; the other volume is sent into the ascending column; so that a volume of water equal to half the content of the barrel is sent into the ascending column by both the up and the down strokes.

A pump exhibited in the international exhibition of 1862, by Messrs. Farcot & Sons, attains this object in a much more simple manner. In it "two equal pistons, with valves affording very large water-ways, work parallel to each other in two pump cylinders. During the successive strokes, the first piston draws in water by its upper surface, and delivers it to the ascending column by causing it to traverse the second piston. In its ascending course, the second piston raises in its turn the column of water by its upper face, while the lower face sucks the water, causing it to traverse the first piston." It will be seen from this description that a valve is placed in each piston, that the cylinders communicate at their base, and that the pistons make their strokes simultaneously. This pump has yielded all the good results promised by its ingenious construction, and it is adopted in the water-supply of Paris.

In spite of the great antiquity of the lift and force pump, it is only of late years that improvements have been introduced into its construction capable of rendering it an efficient machine—that is, one which returns in the shape of water raised, a good proportion of the power applied to it. In 1849 M. Morin found by experiments that the power lost was 55 to 82 per cent—that is to say, that of the motive-power, 45 per cent was yielded in the best and 18 in the worst, giving an average of about 30 per cent. In 1851 the jury, reporting on those exhibited in the great exhibition, say that it is one of our worst machines, considered in a mechanical sense, as a means of producing a given result with the least possible expense of power. In those exhibited in the international exhibition of 1862, we find a marked improvement. The jury report that "a large number of constructors have sought to give the waterways and valves dimensions which render as small as possible the loss of power by friction. They have also sought to give a continuous movement to the ascending column of water, independently of the action of the reservoir of air."

3. *The Chain-pump.*—This pump is formed in general of plates of wood fastened to an endless iron chain, and moving upward in a rectangular case or box. There was exhibited in the international exhibition of 1862 a pump of this description called "Murray's chain-pump;" a pump which is very much used on public works, on account of the ease of its construction and erection, and its admirable efficiency even at considerable heights. In this pump, the friction is reduced by having only 3 or 4 lifts instead of 20 or 30, as was previously the case. The chains pass under a roller at the foot, and are driven by a small pitch-wheel at the top, over which they are conducted, and which is driven by appropriate gearing. The lifts feather in passing over the wheel to the descending side, and only unfold when brought round to the ascending side; thus the pump is enabled to take off the water with the same dip as other pumps. The pump is not liable to be choked, as a back turn of the chain immediately releases any substance getting between the lift and the barrel. The speed is variable, in proportion to the duty required. The speed at which the chain is ordinarily worked is from 200 to 300 ft. per minute. The greatest lift yet made by Murray's chain-pump is 60 ft. high; but it is considered that 100 tons of water per minute could be raised 100 ft. high. From 10 to 12 ft. apart has been found to be the best pitch for the lifts; putting them nearer, needlessly increases the friction. Experiments made by Mr. Lovick for the metropolitan board of works, showed that the slip of the lifts which work in the barrel, and are one-eighth of an inch shorter each way than the barrel, averaged 20 per cent of their motion, and that the useful work done averaged 68 per cent of the indicator horse-power of the engine working it.

4. *The Centrifugal Pump.*—These pumps, with reference to those previously described, may be called new, as, though they have been in use in one form or another for at least a century, their merits were not brought prominently forward till the year 1851, when the great efficiency of the models exhibited by Messrs. Appold, Gwynne, and Bessemer drew general attention to the subject.

The essential parts of this pump are—1. The wheel to which the water is admitted at the axis, and from which it is expelled at the circumference, by the centrifugal force due to the rotatory motion imparted to it in passing through the rapidly revolving wheel; and 2. The casing or box in which the wheel works, and by which the entering water is separated from that discharged.

Fig. 2 is a section of a centrifugal pump. The water enters the pump by the supply-pipes A, A, which lead to the central orifices of the wheel B; it then passes through passages formed by the vanes and the side covering-plates of the wheel. In passing through these passages of the wheel, which is made to revolve by power applied to the shaft E, it acquires a rotatory motion, which still continues when it leaves the circumference of the wheel, and enters the circular whirlpool chamber F; so that the interior of the pump may be looked on as a whirlpool, extending from the axle of the wheel to the circumference of the whirlpool chamber. Into this whirlpool the water is drawn at the central orifice of the wheel, and discharged by a pipe at the circumference of the whirlpool chamber; and the force with which it is discharged, or the height to which it will rise in the outlet pipe is measured by the centrifugal force of the water revolving in the whirlpool.

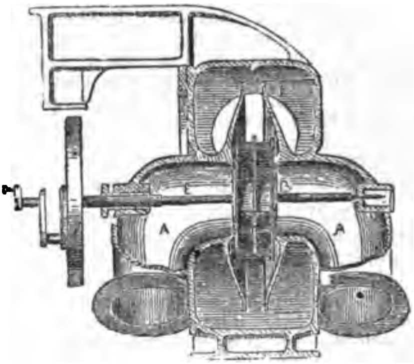


FIG. 2.

With reference to the efficiency of these pumps, it is impossible to give any accurate estimate, since as high as 70 per cent of the applied power is claimed to be returned by forms of the pump shown in figs. 7 and 8, while some other descriptions experimented on in 1851 gave only 18 per cent of useful effect.

It will be evident, from the above description of the pump, that the height to which the water will be raised depends entirely upon the speed of revolution of the wheel; and it is by this that the application of centrifugal pumps is limited to comparatively low lifts of say less than 20 ft., as the speed for high lifts requires to be greater than can be conveniently and usefully attained in practice. They are best applied when raising large quantities of water through low lifts. It will also be observed, that on account of the simplicity of their parts, and the absence of valves, they are much less liable than other pumps to be choked by the entrance of solid materials. In some descriptions of this pump, the exterior whirlpool chamber is dispensed with; and to the vanes of the wheel is given such a curvature backward from the direction of motion, that the water leaving the circumference of the wheel is spouted backward from the vane-passages with a speed equal to that of the wheel in the opposite direction, so that it has only a radial motion with reference to a fixed object; in other words, that the force is acquired from the radial component of the pressure of the vanes, instead of the centrifugal force of the revolving water. Those pumps, however, give the best results which, as the one above described, combine both actions. In all cases, curved vanes are much superior to straight ones.

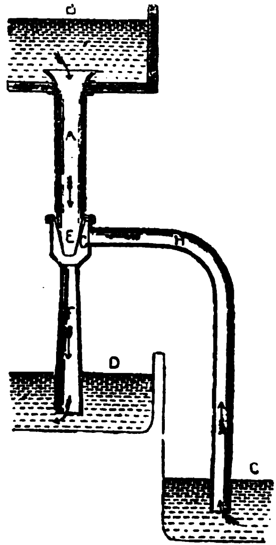


Fig. 3.

5. *The Jet-pump.*—This pump is worked by water-power, and is worthy of notice on account of the extreme simplicity of its parts, and of not requiring the care of an attendant while in operation.

Fig. 3 is a representation of this pump, C is the water which it is required to raise to the level of the water D, and B is the water in the stream available for working the pump. The water B passes down the pipe A, and is discharged from the jet or nozzle, E, into the conical pipe F. Round the nozzle is the vacuum-chamber G, at the bottom of which is attached the conical pipe F, and into the side of which the suction-pipe H enters from the water to be pumped. The water, in passing from the nozzle into the conical pipe, carries air with it, and so gradually forms a vacuum in the chamber G, when the water rises into it from the level C, through the pipe H; and it is in turn carried with the jet down the conical pipe into the discharge-level D. The velocity of the water coming from the jet is gradually retarded by the action of the conical pipe, the speed decreasing as the area of suction increases; and the *vis viva* of its motion is by this retardation converted into a sucking force, drawing the water from the suction-pipe through the vacuum chamber into the conical pipe. The water issuing from the jet will have a speed equal to that produced by a column of the height BC, or the sum of the fall and lift. This pump may be viewed, for purposes of explanation, as a syphon, into the shorter leg of which a jet of water is injected, which overcomes the pressure due to the difference of levels, and reverses the ordinary motion of the water in a syphon. An efficiency of 18 per cent has been obtained from this pump, which is low, as compared with that obtained from other descriptions of pump; yet in cases where waste of water-power is not so much to be avoided as expense in erecting, working, and maintenance, these pumps possess decided advantages. The case to which they are peculiarly applicable is the drainage of marshes, which have streams of water adjacent to them descending from a higher level.

PUMPELLY, **Raphael**; b. Owego, N. Y., 1837; educated in scientific branches, and especially metallurgy, chemistry, and geology, at Paris, Hanover, and Freiburg-in-Saxony. On his return in 1860 he had charge of some mines in Arizona and other parts of the far west, and in 1861 was employed by the government of Japan to explore the island of Yezo. In 1866 he became professor of mining engineering at Harvard college. In 1870 he made a survey of the copper regions of Michigan, and the next year became state geologist of Missouri. Besides many scientific articles and geological reports he has published *Across America and Asia*, an account of his overland journey from Japan through Mongolia, Siberia, and Russia.

PUMPING ENGINE, an engine especially designed for pumping. A pump may be driven by an ordinary steam-engine which also drives other machinery, but in the pumping-engine the pump and steam-engine are inseparably connected, and are confined to the act of pumping. There are a good many small machines of this kind which only pump, but they are not commonly called pumping-engines, that term being applied only to large works. The first steam-engines were pumping-engines; that of Newcomen, which was driven by atmospheric pressure (steam being used only to create a vacuum), and Watt's, and the Cornish engine, which used steam as the motive-power. See Steam-Engine. There has been much improvement in the duty of pumping engines since the Newcomen engine. Estimating the work done by the number of pounds raised one foot by a bushel of Welsh coal (94 lbs.), the following shows the improvement which has been made: Newcomen engine 1769, 5,500,000; do. improved by Smeaton 1772, 9,500,000. Watt's engine 1778 to 1815, 20,000,000. Improved Cornish engine 1820, 28,000,000; do. 1826, 30,000,000; do. 1828, 37,000,000; do. 1829, 41,000,000; do. 1839, 54,000,000; do. 1850, 60,000,000. Consolidated mines, highest duty 1827, 67,000,000. Fowey consols, Cornwall, highest duty 1834, 97,000,000. United mines, highest duty, 1842, 108,000,000. Among the largest pumping-engines in the world are the three which were employed in the drainage of Haarlem lake in Holland. Each engine worked several pumps, and had an average duty of 75,000,000 lbs., raised one foot by 94 lbs. of Welsh coal. One of the engines is described as follows: Two steam cylinders are placed concentrically, the diameters being 144⅛ and 84¼ inches. They are united at the bottom, but there is a space of 1½ in. between the inner cylinder and the top. The areas of the pistons are as 1 to 2.85, and are connected to a common cross-head or cap by one principal and four small piston-rods. This engine works 11 pumps, each of 63 in. (5¼ ft.) diameter. The measured delivery of all the 11 pumps at each stroke is 63 tons. The steam is cut off in the small cylinder at from one-quarter to two-thirds the stroke, and after expanding through the remainder it is further expanded in the large cylinder. A good example of a pumping-engine is the Holly pumping-engine, for a description of which see WATER SUPPLY. See also STEAM-PUMP.

PUN is the name given to a play upon words. The wit lies in the equivocal sense of some particular expression, by means of which an incongruous and therefore ludicrous idea is unexpectedly shot into the sentence. One or two examples will make the matter clearer than any definition. Two persons looking at a beggar-boy with an extraordinary big head—"What a tower!" cried the first. "Say, rather," replied the second, "what a *fort o' lice*" (fortalice).—A noted punster was once asked, with reference to Mr. Carlyle's writings, if he did not like "to expatiate in such a field." "No," was the felicitous rejoinder; "I can't get over the *style*" (stile).—A Massachusetts lady complaining to a friend that her husband (whose business had taken him to the far west) constantly sent her letters filled with expressions of endearment, but no money, was told, by way of comfort, that he was giving her a proof of his *unremitting* affection!

PUNCH, the chief character in a popular comic exhibition performed by means of *puppets* (q.v.). Various accounts are given of the origin of the name. The exhibition is of Italian origin, and the Italian name is *Pulcinella*, or *Policinella*. According to one story, a peasant, a well-known character in the market-place of Naples, got the name Pulcinella from dealing in fowls (*pulcinelli*), and after his death was personated in the puppet-shows of the San Carlino theater. Another account makes the word a corruption of Puccio d'Aniello, the name of a witty buffoon of Acerra who joined a company of players, and became the favorite of the Neapolitan populace. Others give his original name as Paolo Cinella. The variety and inconsistency of the legends show them to be myths—histories invented to account for the name. The modern Punch is only a modification of an ancient mask (q.v.) to be seen represented on ancient vases, and taken perhaps from the Oscan Atellanæ; and the Italian name is pretty evidently a diminutive of *pollice*, the thumb—Tom Thumb (the dwarfs of northern mythology are sometimes styled *däumling*, thumkins). The English name *Punch* is apparently identical with Eng. *paunch;* Bavarian *punzen*, a cask; Ital. *punzone*, a puncheon; and denotes anything thick and short (e.g., a Suffolk *punch*). The name *Punchinello* seems to have arisen from blending the English and Italian names.

The drama or play in which the modern Punch figures is ascribed to an Italian comedian, Silvio Fiorillo, about 1600. The exhibition soon found its way into other countries, and was very popular in England in the 17th century. Its popularity seems to have reached its height in the time of queen Anne, and Addison has given in the *Spectator* a regular criticism of one of the performances. The scenes as now given by the itinerant exhibitors of the piece are much shortened from what were originally performed, in which allusions to public events of the time were occasionally interpolated. The following is an outline of the plot as performed in 1813. Mr. Punch, a gentleman of great personal attraction, is married to Mrs. Judy, by whom he has a lovely daughter, but to whom no name is given in this piece, the infant being too young to be christened. In a fit of horrid and demoniac jealousy, Punch, like a second Zeluco, strangles his beauteous offspring. Just as he has completed his dreadful purpose Mrs. Judy enters, witnesses the brutal havoc, and *exit* screaming; she soon returns, however, armed with a bludgeon, and applies it to her husband's head, "which to the wood returns a wooden sound." Punch at length exasperated seizes another bludgeon, soon vanishes his already weakened foe, and lays her prostrate at his feet; then seizing the murdered infant and the expiring mother, he flings them both out of the window into the street. The dead bodies having been found, police-officers enter the dwelling of Punch, who flies for his life, mounts his steed; and the author neglecting, like other great poets, the confining unities of time and place, conveys his hero into Spain, where, however, he is arrested by an officer of the terrible inquisition. After enduring the most cruel tortures with incredible fortitude, Punch, by means of a golden key, opens his prison door and escapes. The conclusion of the story is satirical, allegorical, and poetical. The hero is first overtaken by weariness and laziness in the shape of a black dog, which he fights and conquers; disease in the disguise of a physician next arrests him; but Punch "sees through the thin pretense," and dismisses the doctor with a few derogatory kicks. Death at length visits the fugitive; but Punch lays about his skeleton carcass so lustily, and makes the bones of his antagonist rattle so musically with a bastinado, that "death his death's blow then received." Last of all comes the devil; first under the appearance of a lovely female, but afterwards in his own natural shape, to drag the offender to the infernal regions, to expiate his dreadful crimes. Even this attempt fails, and Punch is left triumphant over doctors, death, and the devil. The curtain falls amid the shouts of the conqueror, who, on his victorious staff, lifts on high his vanquished foe.

The well-marked peculiarities in the original personification of Punch, which were a high back, distorted breast, and long nose, were intended to give an increased zest to his witticisms; but these features have been much exaggerated in the now so well-known illustrations of the popular periodical which bears his name.

The performance of Punch, as generally represented, requires the assistance of only two persons—one to carry the theater and work the figures, the other to bear the box of puppets, blow the trumpet, and sometimes keep up the dialogue with the hero of the piece. The movements of the puppets are managed simply by putting the hands under the dress, making the second finger and thumb serve for the arms, while the forefinger works the head.

PUNCH, or the LONDON CHARIVARI, the English comic journal par excellence, is a weekly magazine of wit, humor, and satire in prose and verse, copiously illustrated by sketches, caricatures, and emblematical devices. It draws its materials as freely from the most exalted spheres of foreign politics as from the provincial nursery; and, dealing with every side of life, is not less observant of the follies of Belgravia than of the peculiarities of Whitechapel. Punch gives due place to Irish bulls and dry Scotch humor, and does its best to present them in the raciest vernacular. Stern in the exposure of sham and vice, Punch is yet kindly when it makes merry over innocent foibles. Usually a *censor morum* in the guise of Joe Miller, a genial English Democritus, who laughs and provokes to laughter, Punch at times weeps with those that weep, and *jocis remotis*, pays a poetical tribute to the memory of the departed great. This wittiest of serial prints was founded in 1841, and, under the joint editorship of Mark Lemon and Shirley Brooks soon became a household word, while, ere long, its satirical cuts and witty rhymes were admittedly a power in the land. Punch is recognized as an English institution, and in corners of Europe where an Englishman rarely comes, the frequenters of the café may be seen puzzling over the esoteric wit and wisdom of Cockaigne. Their contributions to Punch helped to make Douglas Jerrold (q.v.), Tom Hood (q.v.), Albert Smith, and Thackeray (q.v.) famous; as their illustrations have done for Doyle, Leech, Tenniel, Du Maurier, and Keene. It should be noted that our comic paper has done memorable service in purifying the moral standard of current wit in England. For the alternative name see CHARIVARI.

PUNCH, a beverage introduced into England from India, and so-called from being usually made of five (Hindu, *pantsh*) ingredients—arrack, tea, sugar, water, and lemon-juice. As now prepared punch may be described as a drink, the basis of which is alcohol, of one or more kinds, diluted with water, flavored with lemon or lime juice and spices, and sweetened with sugar; sometimes other ingredients are added according to taste, especially wine, ale, and tea. The mixture is usually compounded in a large china bowl made for the purpose, and is served out in glasses by means of a ladle. It is much more rarely seen now than formerly, which is not to be regretted, for a more unwholesome or intoxicating beverage could hardly be compounded. The ordinary mixed punch consists of the following ingredients: the juice of three lemons squeezed out into a large jug, and one lemon cut into slices, with the rind on for flavor; twelve ounces of loaf-sugar, and two quarts of boiling water; after being infused half an hour, and strained off, the liquid is poured into the punch-bowl, and half a pint of rum and of brandy are added. A favorite mode of drinking this composition at present is as a liqueur after fish at dinner, for which purpose it is bottled, and when wanted, is iced, either by placing the bottles in rough ice, or by pounding and mixing in fine ice. The principal varieties of punch, in addition to this, are rum, gin, and brandy punches, in which only one of the spirits mentioned is used, and champagne, milk, orange, raspberry, tea, wine punches.

PUNCH, a tool for cutting circular or other shaped pieces out of metal, wood, or other materials. The simplest form of this instrument consists of a piece of steel formed at one end into a hollow cylinder, the end of which is ground to a very sharp cutting edge. The other end of the punch is made strong and thick, to receive blows from a hammer, and to serve as a handle. When the instrument is in use, the cutting edge is applied to the surface which is to be perforated, and a blow sufficiently hard is struck on the end of the handle. when a circular piece of the material is cut out and left in the hollow part, which can be removed at the upper end of the cylinder. The mode of manufacturing such tools is very simple. A piece of square steel-bar is taken, the thickness of which must correspond with the thickness of the handle. This is brought up to a sufficient heat in the furnace, and is then beaten or rolled laterally so as to have about the shape of a chisel. In the next stage, the edges are brought up; and finally, a mandril is put into the groove thus made, and the edges are brought together, and welded: the mandril is then withdrawn, and the tool goes to be ground and finished. It will be obvious that, by skill, punches may be made which will make holes of almost any shape. The enormous development of our iron manufactures has necessitated the use of machine-tools in the place of those made for the hand, and none of the very ingenious inventions for this purpose have played a much more important part than the *punching-machines*, for without them the labor of drilling holes in iron plates for such objects as steam-boilers, iron-ships, bridges, and other great works, would have been so great as to have effectually prevented them from being undertaken. The punching-machine invented by Messrs. Roberts and Nasmyth, with recent modifications and improvements, is in very general use in all our great engineering works; its essential parts are the punch, lever, and the spring. The punch is simply a piece of tough, hard steel of a cylindrical form, and of the size of the intended holes; it fits into a socket, which is suspended over a fixed iron plate or bench, which has a hole exactly under the punch, and exactly fitting it. In the socket which holds the punch is a coiled iron spring, which holds up the punch, and allows it to descend when the power is applied, and returns it when the pressure is relieved. The lever, when in action, presses on the top of the punch, and the plate of metal which is to be perforated being placed on the iron bench, receives the pressure of the punch with sufficient force to press out a disk of metal exactly the diameter of the punch, which falls through the hole in the iron bench. The lever is moved by a cam on a powerfull wheel, which presses upon it until it can pass; then the lever being relieved, the punch is drawn up by the spring in its socket, ready to receive the action of the cam when the revolution of the wheel again brings it to bear on the lever. The punch itself is always solid, differing entirely in this respect from the hand-tools. This useful machine will perforate thick plates of iron, such as are used for ship-building, almost as quickly as a workman with an ordinary hand-punch could perforate thin plates of tin; the holes made are quite true, and are ready to receive the rivets.

PUNCTUA'TION, the division of a writing into sentences, and the subdivision of these into parts by means of certain marks called *points*, a great help to the clear exhibition of the meaning and to the pleasant reading of what is written. The ancients were not acquainted with the use of points, or used them very little, and only for oratorical purposes. Punctuation, according to the grammar and sense, is said to have been an invention of the Alexandrian grammarian, Aristophanes; but was so much neglected and forgotten, that Charlemagne found it necessary to ask Warnefried and Alcuin to restore it. It consisted at first of a point called the *stigma*, and sometimes a line, variously formed and introduced. The system of punctuation now in use was introduced by the Venetian printer, Manutius, in the latter part of the 15th c.; the example was soon and generally followed, and little change has since been found requisite.

PUNCTUATION (*ante*), the division of any written or printed composition into words, phrases, and sentences by certain marks, commonly called punctuation points. This process enables the writer to express his ideas more clearly, and the reader to understand more readily and more fully. Material errors in the arrangement of an author's ideas, and in the order of the phrases in the sentences, have been detected and corrected by the judicious application of a critical punctuation. For a long period after the introduction of the alphabet into general use, all the words, sentences, and letters of every composition were written continuously, and usually in large capitals at equal distances, after this manner: "GOTOTHEANTTHOUSLUGGARDCONSIDERHERWAYSANDBEWISE." When the writing was in small letters, it would be given in this fashion: "theLordismyshepherdIshallnotwant." By whom the earliest attempts at punctuation were made is not known. The art has been very slowly developed. Some of the most trustworthy writers on archæology ascribe the earliest attempts to Aristophanes; others to Thrasymachus, and to various other Grecian scholars several centuries before Christ. But whatever efforts were thus made, they were imperfect and transient. In the 8th c. Charlemagne directed several of the most learned men of that age to revive and remodel these obsolete attempts at punctuation; but with results scarcely more effective or enduring than those whose lost memories they aimed to revive.

Near the close of the 15th c. Aldus Manutius, otherwise known as Manuzio, Manuzzi, or Manucci, also called Aldus the elder, was an eminent printer and publisher in Venice. In making some of his numerous improvements in the art of printing he became impressed with the necessity of facilitating the more ready understanding of printed matter. He invented and practically applied the main features of that system of punctuation which, with few important changes from time to time, has continued to the present day.

In modern times punctuation is considered one of the most difficult parts of grammar fully to explain or rightly to understand. Grammarians differ widely in their general rules, and authors differ quite as widely in their application of these rules to particular cases. As to the most important principles, however, there is a very general agreement. Among the various marks and characters employed in this scheme of punctuation, the period, the colon, the semi-colon, and the comma are the most important and the most frequent. Other marks in use are interrogation and exclamation points, quotation marks, the hyphen, the apostrophe, etc.

The comma, from the Greek *κυπτειν*, to cut off, indicates a shorter pause in reading, and demanding usually less notice than any other punctuation point. Under some circumstances, however, it has great importance. Its design and value are readily seen, yet the occasions for its use, from their great number and variety, are most difficult to specify and define. When more than two nouns, adjectives, verbs, or adverbs succeed each other in a series, in either of the elements of a simple sentence, they should each be separated by commas, including, by latest usage, even the last couplet, in which the connecting conjunction is expressed. Many qualifying and explanatory phrases, and adverbs when so used, require a comma before and after them. The name of a person addressed or of anything thus personified, all words and phrases used independently, the members of compound sentences, antithetical and parenthetical words and phrases, each word of a series in the same construction, and words repeated for the sake of emphasis, should be separated before and after by commas. But when words or ideas are arranged in pairs, the comma is placed only after each couplet. The semi-colon is used to separate those members of a compound sentence which demand a longer pause than a comma, or which contain in themselves the principal elements of a sentence, but do not, either of them, individually, fully express the main ideas of the sentence. This point is also used when the members of a compound sentence are antithetical. The colon marks a still longer pause than the semi-colon. It is placed after the address in the commencement of a letter or other communication; as, "My Dear Sir:" "To the Editor of the Galaxy:" This point is also legitimately placed near the close of any long sentence that is not yet completed, especially if two or more semi-colons have immediately preceded in the same sentence. The period is placed at the end of every paragraph, and of every completed sentence, except when the sentence ends with a question or an exclamation. It is placed also after the titles or other headings of the chapters, and all other important divisions of a volume or other treatise.

To understand fully and to apply in the best manner the principles of punctuation is more difficult from the fact that the best writers and most critical grammarians differ so widely from each other, and even from themselves at different times and in different circumstances. It is, then, impossible to give strict and universal rules for the application of the principal punctuation points. Punctuation demands for its full elucidation, and its successful application, a quick apprehension, good judgment, a cultivated taste, and an extensive and varied reading.

PUNDERPUR', or PANDHARPUR, a t. of British India, in the district of Sholapur, and presidency of Bombay, 90 m. e. from Satara, on the right bank of the Bima, a large branch of the Kistna. It is highly revered by the Hindus, on account of a celebrated temple dedicated to an incarnation of Vishnu. Pop. '72, 16,275.

PUNDLER, the name which in Scotland used to be given to a person employed on an estate as hedger, ditcher, forester, and general guardian, in absence of the proprietor. The office of a pundler was probably analogous to that of poynder. In a few cases, the term pundler is still employed.

PU'NIC WARS, the name commonly given to the three great wars waged for supremacy between Rome and Carthage. The Latin word *punicus*, or *pœnicus*, was the name given by the Romans to the Carthaginians, in allusion to their Phenician descent. For an outline of the struggle between the two rival powers, see CARTHAGE, ROME, HAMILCAR, HANNIBAL, and the SCIPIOS. The Romans, who believed, not without reason, that the Carthaginians never sincerely meant to keep any treaty of peace, employed the phrase *punica fides*, "Punic faith," to denote a false and faithless spirit.

PU'NICA. See POMEGRANATE.

PUNISHMENT, in this country, usually means the deprivation of property or liberty, or the infliction of pain on the body of one who commits a criminal offense. It is not applicable, generally, to civil actions, though these are also followed with the compulsory payment of money, and failing which, with the deprivation of property and liberty. As the legal consequence of crimes, punishment consists chiefly of the infliction of pain on the body, and this ranges from capital punishment or death, down to imprisonment for a term of years, and, in some cases, whipping is added; and in military and naval offenses, flogging. Capital punishment is inflicted only in case of treason and murder (but there are other instances under naval or army discipline), and in the form of hanging (q.v.). In crimes of less degree, imprisonment, or penal servitude (q.v.) for a term of years, is the punishment. As a general rule, the judge has a discretion to fix the punishment within two defined limits. In the great mass of the smallest crimes, which are cognizable by justices of the peace, and are frequently termed offenses punishable summarily, the usual punishment is a fine or penalty, i.e., a sum of money is ordered to be paid by the offender, and if he do not pay it, his goods are sold to make up the sum; failing which, he is committed to the house of correction for a short period of 3, 6, or 12 months; but, in some of the cases, imprisonment and hard labor are imposed in lieu of a fine. The crown can put an end to a sentence of punishment by a free pardon, or may commute a sentence of death to imprisonment for life.

PUNISHMENT (*ante*). Three theories concerning the design of punishment are held—those of retribution, prevention, and reformation. According to the first the only purpose of punishment is the vindication of the law upon the transgressor, or the infliction upon him of such pain or deprivation as he deserves: its motto might be said to be, justice. The second makes prevention the only object, the offender being kept from further wrong-doing, and others being deterred from criminal acts by the certainty of punishment: its motto, protection. The third theory regards the reformation of the criminal as the only legitimate design of punishment, and maintains that when this is accomplished, further punishment should cease: its motto, love; probably no one of these three theories exhausts the whole content of punishment; yet each may have a certain application—the question then becoming one as to which of the three shall be prominent.

PUNISHMENT, Future. See Hell.

PUNISHMENTS, Military and Naval. These, in the British service, include death, by shooting, if for an offense against discipline—or by hanging, if for a disgraceful offense; for serious crimes in the field against discipline, flogging, not exceeding 50 lashes, with the cat-o'-nine-tails (see Flogging); for minor offenses, degradation of rank, imprisonment, extra drill, stoppage of grog, loss of good-conduct pay, stoppage of leave, etc. Death, degradation, and loss of leave are the only punishments of those named above which can be inflicted on an officer. An officer can only be punished by sentence of a court-martial; he may be cashiered, dismissed the service, deprived of his regiment or ship; or, in the navy, reduced in rank by being placed at the bottom of the list of officers of his grade. In certain of the German armies, punishment is inflicted on the men in the form of strokes with a cane or with the flat of a saber.

PUNJAB, or Panjab (from two Persian words signifying "five rivers:" the *Pentapotamia* of the Greeks), is an extensive territory in the n.w. of Hindustan, watered by the Indus, and its five great affluents—the Jhelum, Chenab, Ravi, Beas, and Sutlej, and forms a British possession since Feb., 1849. It is bounded on the w. by the Suliman mountains, on the n. by Cashmere, and on the e. and s.e. by the Sutlej, which, in its lower course, is called the Ghara. The extreme length is about 800 m., and the width about 650 miles. The total area is over 200,000 sq.m., more than half of which is the territory of feudatories. The British possessions are 101,829 sq.m., of which less than a third is cultivated. According to the census of 1868 as finally revised and corrected, the pop. is 17,611,498; giving an average of 173 to the sq.mile. The length of roads is 20,798 m.; railways open, 412 miles. The physical character of the northern contrasts strikingly with that of the southern districts. In the n., the whole surface is traversed by spurs from the Himalayas, which inclose deep valleys. In the s., the surface is unbroken by any important eminence, except the Salt range, varying from 2,000 to 5,000 ft. high, between the Indus and the Jhelum. The country, divided into five doabs, or interfluvial tracts, and frequently spoken of as the plains of the Indus, has a general slope toward the s.w. The climate in the plains is most oppressively hot and dry in summer, reaching in May 115° to 121° in the shade at several stations; but cool, and sometimes frosty, in winter. Little rain falls except in the districts along the base of the Himalayas. The soil varies from stiff clay and loam to sand; but, in general, is sandy and barren, intermixed with fertile spots. The rivers afford abundant means of irrigation. The indigenous vegetation of the Punjab is meager. Trees are few in number and small, and fuel is so scarce that cow-dung is much used in its stead. With an efficient system of agriculture, however, the territories of this part of India might be rendered very productive. Of the ordinary crops, wheat of excellent quality is produced in considerable quantities, and indigo, sugar, cotton, tobacco, opium, buckwheat, rice, barley, millet, maize, and numerous vegetables and fruits are grown. The manufacturing industry of this region is very considerable, and is carried on for the most part in the great towns, as Amritsir (q.v.), Lahore (q.v.), Multan (q.v.), etc. Spices and other groceries, dye-stuffs, cloths, metals, and hardware, are imported from the more eastern provinces of British India; and grain, ghee, hides, wool, carpets, shawls, silk, cotton, indigo, tobacco, salt, and horses are exported. The inhabitants are of various races, chiefly Sikhs, Jats, Gujurs, Rajputs, and Patans. Of the whole population, nearly two-thirds are Mohammedans; the remaining third is pretty fairly divided between those of the Hindu faith and the Sikhs. There are upward of 17,000 Europeans in the Punjab. The Jats are the most prominent of the races of the Punjab, and are said to have formed the "core and nucleus" of the Sikh nation and military force. Of the history of the Punjab, all that is important is given under the heading Sikhs.

PUNKAH, a gigantic fan for ventilating apartments, used in India and tropical climates. It consists of a light frame of wood, covered with calico, from which a short curtain depends, and is suspended by ropes from the ceiling; another rope from it passes over a pulley in the wall to a servant stationed without; the servant pulls the punkah backward and forward, maintaining a constant current of air in the chamber.

PUNSHON, William Morley, d.d., 1824–81; b. England; became local preacher in the Methodist connection in 1840 at Sunderland; studied as a probationer at the Wesleyan college, Richmond; became pastor at Marden in Kent; and at Whitehaven in 1845. After this he was stationed at Carlisle, Newcastle-on-Tyne, Sheffield, and Leeds, removing in 1858 to London, where he remained for nine years. In 1868 he went to Canada as a delegate to the Canada conference from the British Wesleyan conference. While there he married the sister of his deceased wife, and remained in Canada as pastor of a church. He visited the United States, preaching and lecturing in some of the principal cities. After the death of his second wife he returned to England, where at one time he was president of the British conference. He was a very popular preacher. He published *Life Thoughts; Sabbath Chimes*, in verse; *The Prodigal Son;* besides *Sermons* and *Addresses*.

PUNT, a heavy, oblong, flat-bottomed boat, useful where stability and not speed is needed. Punts are much used for fishing. Some are fitted for oars, but the more usual mode of propulsion is by poles operating on the bottom. Punting is a very laborious exercise.

PUNTA ARENAS, a t. in Costa Rica, on the gulf of Nicoya, the port of San José; 60 m. northwest. The Pacific Mail and Panama railroad steamers stop here. It is connected with Cartago by telegraph. The climate is unhealthful, and the permanent population small.

PUPA (Lat. a girl, or a doll), the second stage of insect life after the hatching of the egg. The first stage after the egg is that of *Larva* (q.v.). In those insects of which the metamorphosis is *complete* (see INSECTS), the pupa is generally quite inactive, and takes no food. This is the case in the *lepidoptera*, the pupa of which is called a *chrysalis aurelia* and in the *coleoptera*, *hymenoptera*, and *diptera*. Manifestations of life may indeed be produced by touching, or in any way irritating, the pupa, but it is incapable of locomotion and of eating. It is quite otherwise with the pupæ of other orders, which are often very voracious, and resemble the perfect insect in almost everything but that the wings are wanting. The peculiarities of the pupa are noticed in the articles on the different orders and genera of insects.

PUPIL. See EYE.

PUPIL, in the law of Scotland, means, in the case of a male, one who is under 14 years of age; in the case of a female, one under the age of 12 years.

PUPPET, a name (derived from the Lat. *pupus*, a child or boy, Fr. *poupée*, a doll) signifying a childlike image. The Italic *fantoccini* (from *fantino*, a child), and the French *marionettes* (q.v.) are other names for puppets. Puppet-plays, or exhibitions in which the parts of the different characters are taken by miniature figures worked by wires, while the dialogue is given by persons behind the scenes, are of very ancient date. Figures with movable limbs have been found in the tombs of ancient Egypt and Etruria. Originally intended to gratify children, they ended in being a diversion for adults. In China and India they are still made to act dramas either as movable figures or as shadows behind a curtain ("ombres chinoises"). In Italy and France puppet-plays were at one time carried to a considerable degree of artistic perfection, and even Lessing and Goethe in Germany thought the subject worth their serious attention. In England they are mentioned under the name of *motions* by many of our early authors, and frequent allusions occur to them in the plays of Shakespeare, Ben Jonson, and the older dramatists. The earliest exhibitions of this kind consisted of representations of stories taken from the Old and New Testament, or from the lives and legends of saints. They thus seem to have been the last remnant of the *moralities* of the 15th century. We learn from Ben Jonson and his contemporaries that the most popular of these exhibitions at that time were the *Prodigal Son*, and *Nineveh with Jonas and the Whale*. Even the Puritans, with all their hatred of the regular stage, did not object to be present at such representations. In the reign of queen Elizabeth, puppet-plays were exhibited in Fleet street and Holborn bridge—localities infested by them at the period of the restoration. The most noted exhibitions of the kind were those of Robert Powell in the beginning of the 18th century. (See Chambers's *Book of Days*, vol. ii. 167.) So recently as the time of Goldsmith, scriptural "motions" were common, and, in *She Stoops to Conquer*, reference is made to the display of Solomon's temple in one of these shows. The regular performances of the stage were also sometimes imitated; and Dr. Samuel Johnson has observed that puppets were so capable of representing even the plays of Shakespeare, that *Macbeth* might be represented by them as well as by living actors. These exhibitions, however, much degenerated, and latterly consisted of a wretched display of wooden figures barbarously formed, and decorated without the least degree of taste or propriety, while the dialogues were jumbles of absurdities and nonsense.

The mechanism of puppet-plays is simple. The exhibitor is concealed above or below the stage, works the figures by means of wires, and delivers the dialogues requisite to pass between the characters. The exhibition of Punch (q.v.) is perhaps the only example of this species of acting which exists in this country at the present time.

PURÂN'A (literally "old," from the Sanskrit *purâ*, before, past), is the name of that class of religious works which, besides the Tantras (q.v.) is the main foundation of the actual popular creed of the Brahminical Hindus (see HINDU RELIGION under INDIA). According to the popular belief, these works were compiled by *Vyâsa* (q.v.), the supposed arranger of the *Vedas* (q.v.), and the author of the *Mahâbhârata* (q.v.), and possess an antiquity far beyond the reach of historical computation. A critical investigation, however, of the contents of the *existing* works bearing that name must necessarily lead to the conclusion, that in their present form they do not only not belong to a remote age, but can barely claim an antiquity of a thousand years. The word *purân'a* occurs in some passages of the *Mahâbhârata*, the law-books of Yâjnavalkya and Manu (q.v.): it is even met with in some *Upanishads* and the great Brâhman' a portion of the White-Yajur Veda; but it is easy to show that in all these ancient works it cannot refer to the existing compositions called Purân'a, and, therefore, that no inference relative to the age of the latter can be drawn from that of the former, whatever that may be. Nevertheless, it must be admitted that there are several circumstances tending to show that there existed a number of works called Purân'a, which preceded the actual works of the same name, and were the source whence these probably derived a portion of their contents. The oldest known author of a Sanskrit vocabulary, Amara-Sinha, gives as a synonym of Purân'a the word *panchalakshan'a*, which means "that which has five (*panchan*) characteristic marks" (*lakshan'a*); and the scholiasts of that vocabulary agree in stating that these *lakshan'as* are: 1. Primary creation, or cosmogony; 2. Secondary creation, or the destruction and renovation of worlds; 3. Genealogy of gods and patriarchs; 4. *Manwantaras*, or reigns of Manus; and 5. The history of the princess of the solar and lunar races. Such, then, were the characteristic topics of a Purân'a at the time, if not of Amara-Sinha himself—which is probable—at least of his oldest commentators. Yet the distinguished scholar, most conversant with the existing Purân'as, who, in his preface to the translation of the *Vishn'u-Purân'a*, gives a more or less detailed account of their chief contents (prof. H. H. Wilson), observes, in regard to the quoted definition of the commentators on Amara-Sinha, that in no one instance do the actual Purân'as conform to it exactly; that "to some of them it is utterly inapplicable; to others, it only partially applies." To the *Vishn'u-Purân'a*, he adds, it belongs more than to any other Purân'a; but even in the case of this Purân'a he shows that it cannot be supposed to be included in the term explained by the commentators. The age of Amara-Sinha is, according to Wilson, the last half of the century preceding the Christian era; others conjecture that it dates some centuries later. On the supposition, then, that Amara Sinha himself implied by panchalakshan'a the sense given to this term by his commentators, there would have been Purân'as about 1900 or 1600 years ago; but none of these have descended to our time in the shape it then possessed.

Various passages in the actual Purân'as furnish proof of the existence of such elder Purân'as. The strongest evidence in this respect is that afforded by a general description given by the *Matsya-Purân'a* of the extent of each of the Purân'as (which are uniformly stated to be 18 in number), including itself; for, leaving aside the exceptional case in which it may be doubtful whether we possess the complete work now going by the name of a special Purân'a, prof. Wilson, in quoting the description from the *Matsya-Purân'a*, and in comparing with it the real extent of the great majority of Purân'as the completeness of which, in their actual state, does not admit of a reasonable doubt, has conclusively shown that the *Matsya-Purân'a* speaks of works which are not those we now possess. We are then bound to infer that there have been Purân'as older than those preserved, and that their number has been 18, whereas, on the contrary, it will be hereafter seen that it is very doubtful whether we are entitled to assign this number to the actual Purân'a literature.

The modern age of this latter literature, in the form in which it is known to us, is borne out by the change which the religious and philosophical ideas, taught in the epic poems and the philosophical Sûtras, have undergone in it; by the legendary detail into which older legends and myths have expanded; by the numerous religious rites—not countenanced by the Vedic or epic works—which are taught, and, in some Purân'as at least, by the historical or quasi-scientific instruction which is imparted, in it. To divest that which, in these Purân'as, is ancient, in idea or fact, from that which is of parasitical growth, is a task which Sanskrit philology has yet to fulfill; but even a superficial comparison of the contents of the present Purân'a with the ancient lore of Hindu religion, philosophy, and science, must convince every one that the picture of religion and life unfolded by them is a caricature of that afforded by the Vedic works, and that it was drawn by priestcraft, interested in submitting to its sway the popular mind, and unscrupulous in the use of the means which had to serve it sends. The plea on which the composition of the Purân'as was justified even by great Hindu authorities—probably because they did not feel equal to the task of destroying a system already deeply rooted in the national mind, or because they apprehended that the nation at large would remain without any religion at all, if, without possessing the Vedic creed, it likewise became deprived of that based on the Purân'as—this plea is best illustrated by a quotation from Sâyan'a, the celebrated commentator on the three principal *Vedas*. He says (*Rigv.*, ed. Müller, vol. i p. 33): "Women and S'ûdras, though they, too, are in want of knowledge, have no right to the Veda, for they are deprived of (the advantage of) reading it in consequence of their not being invested with the sacred cord; but the knowledge of law (or duty) and that of the supreme spirit arises to them by means of the Purân'as and other books (of this kind)." Yet to enlighten the Hindu nation as to whether or not these books—which sometimes are even called a fifth Veda—teach that religion which is contained in the *Vedas* and *Upanishads*, there would be no better method than to initiate such a system of popular education as would reopen to the native mind those ancient works, now virtually closed to it.

Though the reason given by Sâyan'a, as clearly results from a comparison of the Purân'as with the oldest works of Sanskrit literature, is but a poor justification of the origin of the former, and though it is likewise indubitable, that even at his time (the middle of the 15th c. A.D.) they were, as they still are, not merely an authoritative source of religion for "women and S'ûdras," but for the great majority of the males of other castes also, it nevertheless explains the great variety of matter of which the present Purân'as are composed, so great and so multifarious indeed, that, in the case of some of them, it imparts to them a kind of cyclopædical character. They became, as it seems, the source of all popular knowledge; a substitute to the masses of the nation, not only for the theological literature, but for scientific works, the study of which was gradually restricted to the leisure of the learned few. Thus, while the principal subjects taught by nearly all the Purana are cosmogony, religion, including law, and the legendary matter which, to a Hindu, assumes the value of history, in some of them we meet with a description of places, which gives to them something of the character of geography; while one, the *Agni-Purana*, also pretends to teach archery, medicine, rhetoric, prosody, and grammar; though it is needless to add that that teaching has no real worth.

One purpose, however, and that a paramount one, is not included in the argument by which Sâyan'a endeavored to account for the composition of the Purân'as—it is the purpose of establishing a sectarian creed. At the third phase of Hindu religion (q.v.), two gods of the Hindu pantheon especially engrossed the religious faith of the masses, Vishn'u (q.v.) and S'iva (q.v.), each being looked upon by his worshipers as the supreme deity, to whom the other as well as the remaining gods were subordinate. Moreover, when the power or energy of these gods had been raised to the rank of a separate deity, it was the female S'akti, or energy, of S'iva, who, as Durgâ, or the consort of this god, was held in peculiar awe by a numerous host of believers. Now, apart from the general reasons mentioned before, a principal object, and probably *the* principal one of the Purân'as, was to establish, as the case might be, the supremacy of Vishn'u or S'iva, and it may be likewise assumed of the female energy of S'iva, though the worship of the latter belongs more exclusively to the class of works known as Tantras. There are, accordingly, Vaishn'ava-Purân'as, or those composed for the glory of Vishn'u, S'aiva-Purana, or those which extol the worship of S'iva; and one or two Purân'as, perhaps, but merely so far as a portion of them is concerned, will be more consistently assigned to the S'âkta worship, or that of Durgâ, than to that of Vishn'u or S'iva.

"The invariable form of the Purân'as," says prof. Wilson, in his *Preface to the Vishn'u-Purân'a*, "is that of a dialogue in which some person relates its contents in reply to the inquiries of another. This dialogue is interwoven with others, which are repeated as having been held, on other occasions, between different individuals, in consequence of similar questions having been asked. The immediate narrator is commonly, though not constantly, Lomaharshan'a, or Romaharshan'a, the disciple of Vyâsa, who is supposed to communicate what was imparted to him by his preceptor, as he had heard it from some other sage. . . . . Lomaharshan'a is called Sûta, as if it was a proper name; but it is, more correctly, a title; and Lomaharshan'a was "a sûta," that is, a bard, or panegyrist, who was created, according to the *Vishn'u-Purân'a*, to celebrate the exploits of princes, and who, according to the *Vayu* and *Padma Purân'as*, has a right, by birth and profession, to narrate the Purân'as, in preference even to the Brahmans."

The number of the actual Purân'as is stated to be 18, and their names, in the order given, are the following: 1. *Brahma-;* 2. *Padma-*, 3. *Vishn'u-;* 4. *S'iva-;* 5. *Bhâgavata-;* 6. *Nâradîya-;* 7. *Mârkan'd'eya-;* 8. *Agni-;* 9. *Bhavishya-;* 10. *Brahma-vaivartta-;* 11. *Linga-;* 12. *Varâha-;* 13. *Skanda-;* 14. *Vâmana-;* 15. *Kûrma-;* 16. *Matsya;* 17. *Garud'a-;* and 18. *Brahmân'da-Purân'a.* In other lists the *Agni-Puran'a* is omitted, and the *Vayu-Puran'a* inserted instead of it; or the *Garud'a* and *Brahmân'da* are omitted, and replaced by the *Vâyu* and *Nr'isinha Purân'as.* Of these Purân'as, 2, 3, 5, 6, 10, 12, 17, are probably 1, are Purân'as of the Vaishn'ava sect; 4, 8, 11, 13, 15, 16, of the S'iva sect; 7 is, in one portion of it, called Devimâhâtmya, the text-book of the worshipers of Durgâ; otherwise, it has little of a sectarian spirit, and would therefore neither belong to the Vaishn'ava nor to the S'aiva class; 14, as prof. Wilson observes, "divides its homage between S'iva and Vishn'u with tolerable impartiality; it is not connected, therefore, with any sectarial principles, and may have preceded their introduction." The *Bhavishya-Purân'a* (9), as described by the *Matsya-Purân'a*, would be a book of prophecies; but the *Bhavishya-Purân'a* known to prof. Wilson consists of five books, four of which are dedicated to the gods Brahmâ, Vishn'u, S'iva, and Twashtr'i; and the same scholar doubts whether this work could have any claim to the name of a Purân'a, as its first portion is merely a transcript of the words of the first chapter of Manu, and the rest is entirely a manual of religious rites and ceremonies. There are similar grounds for doubt regarding other works of the list.

If the entire number of works, nominally, at least, corresponding with those of the native list, were taken as a whole, their contents might be so defined as to embrace the five topics specified by the commentators on the glossary of Amara-Sinha; philosophical speculations on the nature of matter and soul, individual as well as supreme; small codes of law; descriptions of places of pilgrimage; a vast ritual relating to the modern worship of the gods; numerous legends; and exceptionally, as in the *Agni-Purân'a*, scientific tracts. If taken, however, individually, the difference between most of them, both in style and contents, is so considerable that a general definition would become inaccurate. A short description of each Purân'a has been given by the late prof. H. H. Wilson, in his preface to his translation of the *Vishnu-Purân'a;* and to it, as well as to his detailed account of some Purân'as in separate essays (collected in his works), we must therefore refer the reader who would wish to obtain a fuller knowledge of these works.—The age of the Purân'a, though doubtless modern, is uncertain. The *Bhâgavata*, on account of its being ascribed to the authorship of the grammarian Vopadeva, would appear to yield a safer computation of its age than the rest; for Vopadeva lived in the 12th c., or, as some hold, 13th c., after Christ; but this authorship, though probable, is not proved to a certainty. As to the other Purân'as, their age is supposed by prof. Wilson to fall within the 12th and 17th centuries of the Christian era, with the exception, though, of the *Mârkan'd'eya-Purân'a*, which, in consideration of its unsectarian character, he would place in the 9th or 10th century. But it must be borne in mind that all these dates are purely conjectural, and given as such by the scholar whose impressions they convey.

Besides these eighteen Purân'as or great Purân'as, there are minor or *Upapurân'as*, "differing little in extent or subject from some of those to which the title of Purân'a is ascribed." Their number is given by one Purân'a as four; another, however, names the following 18: 1. *Sanatkumâra-;* 2. *Nârasinha-;* 3. *Nâradîya-;* 4. *S'iva-;* 5. *Durvâsasa-;* 6. *Kâpila-;* 7. *Mânava-;* 8. *Aus'anasa-;* 9. *Vârun'a-;* 10. *Kâlikâ-;* 11. *S'âmba-;* 12. *Nandi-;* 13. *Saura-;* 14. *Pârâs'ara-;* 15. *Âditya-;* 16. *Mâhes'wara-;* 17. *Bhâgavata-* (probably, however, a misreading for *Bhârgava*); and 18. *Vâs'ishtha-Upapurân'a*. Another list, differing from the latter, not in the number, but in the names of the Upapurân'as, is likewise given in prof. Wilson's *Preface to the Vishn'u-Purân'a*. Many of these Upapurân'as are apparently no longer procurable, while other works so called, but not included in either list, are sometimes met with; for instance, a *Mudgala* and *Ganes'a* Upapurân'a. The character of the Upapurân'as is, like that of the Purân'as, sectarian; the *S'iva-Upapurân'a*, for instance, inculcates the worship of S'iva, the *Kâlikâ-Upapurân'a* that of Durgâ or Devî.

Both Purân'as and Upapurân'as are for a considerable portion of their contents largely indebted to the two great epic works, the *Mahâbhârata* (q.v.) and *Râmâyan'a* (q.v.), more especially to the former of them. Of the Purân'as, the original text of three has already appeared in print: that of the *Bhâgavata* in several native editions, published at Bombay, with the commentary of S'rîdharaswâmin, and partly in a Paris edition by Eugène Burnouf, which remained incomplete through the premature death of that distinguished scholar; that of the *Mârkan'-d'eya-Purân'a*, edited at Calcutta in the *Bibliotheca Indica*, by the rev. K. M. Banerjea; and that of the *Linga-Purân'a*, edited at Bombay for, regarding a fourth, the *Garud'a-Purân'a*, edited at Benares and Bombay, it seems doubtful whether that little work is the same as the Purân'a spoken of in the native list. Besides these, small portions from the *Padma*, *Skanda*, *Bhavishyottara*, *Mârkan'd'eya*, and other Purân'as have been published in India and Europe. Of translations we have only to name the excellent French translation by Burnouf of the first nine books of the *Bhâgavata*, and the elegant translation of the whole *Vishn'u-Purân'a*, together with valuable notes by the late prof. H. H. Wilson, which has recently been republished in his works, in a new edition, amplified with numerous notes, by prof. F. E. Hall.—For general information on the character and contents of the Purân'as, see especially Wilson's preface to his translation of the *Vishn'u-Purân'a* (Works, vol. vi., Lond. 1864), Burnouf's preface to his edition of the *Bhâgavata* (Paris, 1840), Wilson's *Analysis of the Purân'as* (Works, vol. iii., Lond. 1864, edited by prof. R. Rost), K. M. Banerjea's *Introduction to Mârkan'd'eya* (Calcutta, 1862), and John Muir's *Original Sanskrit Texts on the Origin and History of the People of India*, vols. i. to v. (Lond. 1858–71).

PURBECK, ISLE OF, a district in the south of Dorsetshire, 14 m. in length from w. to e., and 7 m. in breadth, is bounded on the n. by the river Frome and Poole harbor, on the e. and s. by the English channel, and on the w. by the stream of Luckford lake, which, rising in the park of Lulworth castle, flows n. and joins the Frome. On the w., however, the water-boundary is not complete, the district being connected with the main portion of the co. at East Lulworth, and the so-called isle of Purbeck is therefore really a peninsula. In ancient times the isle of Purbeck was a royal deer-forest. See PURBECK BEDS and PURBECK MARBLE.

PURBECK BEDS, a group of strata forming the upper members of the oolitic period (q.v.), and so named because they are well developed in the peninsula called the isle of Purbeck (q.v.), s. of Poole estuary in Dorsetshire. They are, like the Wealden beds above them, chiefly fresh-water formations; but their organic remains join them more closely to the marine-formed oolites below than to the superior Wealden series. Though of a very limited geographical extent, the Purbeck beds have yet considerable importance from the changes in animal life that took place during their deposition. Generally less than 200 ft. in thickness, they, however, exhibit three distinct and peculiar sets of animal remains. This has caused them to be arranged into three corresponding groups, known as the upper, middle, and lower Purbecks.

The upper Purbecks are entirely fresh-water, and the strata are largely charged with the remains of shells and fish; the cases of the entomostraca cyprides are very abundant and characteristic. The building-stone called Purbeck marble belongs to this division.

The middle Purbecks record numerous changes during their deposition. The newest of the strata consists of fresh-water limestone, with the remains of cyprides, turtles, and fish. This rests on brackish water-beds—cyrena with layers of corbula and melania. Below this there are marine strata, containing many species of sea-shells. Then follow some fresh and brackish-water limestone and shales, which again rest on the cinder-bed, a marine argillaceous deposit, containing a vast accumulation of the shells of a small oyster. This is preceded by fresh-water strata, abounding in the remains of entomostraca, and containing some beds of cherty limestone, in which little bodies, believed to have been the spore-cases of species of chara, have been found. At the base of this sub group, a marine shale occurs, containing shells and impressions apparently of a large zostera.

The lower Purbecks begin with a series of fresh-water marls, containing entomostraca and shells. These rest on strata of brackish-water origin; and then follows a singular old vegetable soil, containing the roots and stools of cycads, and the stems of coniferous trees. From its black color and incoherent condition, this layer has received from the quarrymen the name of the "dirt-bed" (q.v.). This rests on the basement-bed of the whole group, which is a fresh-water limestone, charged with entomostraca and shells, and contains the thin layer in which Mr. Beckles has lately found the remains of several species of mammalia.

PURBECK MARBLE is an impure fresh-water limestone, containing immense numbers of the shells of paludina, from which it derives its "figure" when polished. It was formerly much used in the internal decoration of churches and other buildings in the southern counties of England. It is quarried in the peninsula of Purbeck, in Dorsetshire, and belongs to the upper section of the Purbeck beds (q.v.).

PURCELL, HENRY, the most eminent of English musicians, was b. at Westminster in 1658, and was son of Henry Purcell, one of the gentlemen of the chapel-royal appointed at the restoration. He lost his father at the age of six, and was indebted for his musical training to Cook, Humphreys, and Dr. Blow. His compositions at a very early age showed evidence of talent. In 1676 he was chosen to succeed Dr. Christopher Gibbons as organist of Westminster abbey; and in 1682 he was made organist of the chapel-royal. He wrote numerous anthems and other compositions for the church, which were eagerly sought after for the use of the various cathedrals, and have retained their place to the present day. Purcell's dramatic and chamber compositions are even more remarkable. Among the former may be mentioned his music to the *Tempest*, his songs in Dryden's *King Arthur*, his music to Howard's and Dryden's *Indian Queen*, to Urfey's *Don Quixote*, etc. A great many of his cantatas, odes, glees, catches, and rounds are yet familiar to lovers of vocal music. In 1683 he composed twelve sonatas for two violins and a bass. Purcell studied the Italian masters deeply, and often made reference to his obligations to them. In originality and vigor, as well as harmony and variety of expression, he far surpassed both his predecessors and his contemporaries. His church music has been collected and edited from the original MS. by Mr. Vincent Novello, in a folio work which appeared in 1826–36, with a portrait and essay on his life and works. He died of consumption in 1695, and was buried in Westminster abbey.

PURCELL, JOHN BAPTIST, D.D., b. Ireland, 1800; educated at Emmittsburg, Md., and at Paris, where he was ordained a Roman Catholic priest in 1826; became professor in Mount St. Mary's college, Emmittsburg, and was its president 1829–33. In 1833 he was consecrated bishop of Cincinnati, and in 1850 archbishop. He has published *Lectures and Pastoral Letters; Life of X. D. McLeod;* and *The Roman Clergy.*

PURCHAS, SAMUEL, 1577–1628; b. at Thaxted, Essex, England; studied at Cambridge; obtained the vicarage of Eastwood, but committing the cure to his brother, he settled in London for the greater advantage of preparing and printing the collection of travels which he had commenced. He published the first volume in 1613, and the last four 12 years later under the title, *Purchas: His Pilgrimage, or Relations of the World, and the Religions Observed in All Ages and Places Discovered from the Creation unto this Present.* In 1615 he was made bachelor of divinity at Oxford, and became rector of St. Martin's, Ludgate, in London, and chaplain to Dr. Abbott, archbishop of Canterbury. The publication of his works brought him into debt. He published also *Microcosmus, or the History of Man; The King's Tower and Triumphal Arch of London; A Funeral Sermon.*

PURCHASE-SYSTEM, a highly unpopular and much misunderstood arrangement in the British army, by which a large proportion—more than half—of the first appointments of officers and their subsequent promotion used to be effected. It dates from the first formation of an English standing army, and was formally recognized in the reign of queen Anne. The system itself was very simple. A price was fixed by regulation for each substantive rank (see PROMOTION), viz.:

	Price.	Difference.
Lieutenant-colonel	£4500	£1300
Major	3200	1400
Captain	1800	1100
Lieutenant	700	250
Cornet or ensign	450	

When any officer holding one of these regimental commissions desired to retire from the army, he was entitled to sell his commission for the price stipulated in the above table—£4,500 in the case of a lieut.col. This sum was made up by the senior maj., who was willing and able to purchase, buying the rank of lieut.col. for £1300; the senior capt., willing and able to purchase, buying a majority for £1400; a lieut. purchasing his company for £1100; a cornet or ensign becoming lieut. on payment of £250; and, lastly, by the sale to some young gentleman of an ensigncy or cornetcy for £450. In practice, fancy prices higher than the above were usually given, according to the popularity of a regiment, and vested interests in these over-regulation prices caused most serious complications whenever the government made any change affecting the promotion of purchase officers The value of commissions in the guards was also greater; but as they constitute but a few regiments, and are mostly officered from the nobility, they do not need particular description.

No commission could be purchased by one officer unless another officer vacated his commission by its sale. Death vacancies, vacancies caused by augmenting a regiment, vacancies resulting from the promotion of colonels to be major-generals, were filled without purchase, usually by seniority. No rank above lieut.col. could be purchased.

It is alleged with truth that purchase enabled the rich man to step over the head of the poorer but perhaps better qualified non-purchasing officer; and that money decided where merit should be the only guide. These disadvantages, however, it is replied, were not unmixed. Purchase, it is argued, introduced into the army men of a very high class in society, who gave a tone to the whole of military life. A great proportion of these wealthy men entered with the intention of merely spending a few years in the army. This tended to keep the officers young—a great advantage; and, further, provided in the country, among its gentlemen, a body of men well adapted for commands in the militia and volunteers. Moreover, selection exercised arbitrarily, as it must be when the men from whom the selection is to be made are scattered all over the world, away from the selecting power, is liable to create dissatisfaction. Under purchase, exchange was a common thing; for the rich officers, for private reasons of locality, etc., were glad to change frequently from regiment to regiment, entering in each case at the *bottom* of the list of officers of their rank in their new regiment. This, of course, was an advantage to the non-exchanging officer, as it pushed him to the top; and the first death or other non-purchase promotion then fell to him. An officer who had not purchased at all might, nevertheless, sell his commission for its full value if he had served 20 years, or for a sum less than the regulated price after shorter service. This was also a spur to promotion. On the whole, though exposed to the disadvantage and annoyance of being passed over by younger officers, the non-purchasing, i.e., the poor officers benefited pecuniarily by the purchase-system. This is proved by the slow progress officers made in corps where purchase did not exist, as, for instance, in the royal marines. Few would counsel the formation of a new army with such a system as purchase; but, on the other hand, it had its advantages in its working. Purchase did not exist in the artillery, engineers, marines, 19th to 21st regiments of cavalry, or 101st to 109th regiments of foot. The purchase-system was abolished by royal warrant in July, 1871; and by the regulation of the forces act of the same year, parliament laid down a scheme for the gradual compensation of officers who had lost their selling rights. Under that scheme it is expected that a sum-total amounting to nearly £8,000,000 will be required.

PURCHASER. See Sale.

PURCHAS JUDGMENT, delivered by the judicial committee of the privy council in *Herbert* v. *Purchas*, an appeal from the Canterbury court of arches brought in 1871. The defendant or respondent was charged with improperly conducting public service at St. James's chapel, Brighton, England. The principal offenses were the use of the mixed chalice, of a cap or beretta, of "holy water," and of wafer-bread in the eucharist, the wearing of certain vestments, and the turning of his back to the people at certain stages of the service. The decision of the court was adverse to Mr. Purchas on all points except that relating to the beretta. The judgment was rendered on an *ex parte* hearing, as the respondent was provided with funds to procure counsel only after the decision was pronounced; his petition for a rehearing of the case was refused, and the course of the court in so doing was the subject of much unfavorable comment. Mr. Purchas was compelled to pay the costs and admonished to discontinue the prohibited practices. He refused to comply, and in 1872 was suspended, and his property sequestrated to pay the costs. He died in Oct., 1872.

PURFLED, or Purflewed, in heraldry, a term used with reference to the lining, bordering, or garnishing of robes, or ornamentation of armor.

PURGA'TION. See Ordeal.

PURGATIVES are medicines which, within definite and comparatively short time after exhibition, produce the evacuation of the bowels. The remedies included under this head have, however, various modifications of action, which adapt them for the fulfillment of different therapeutic applications. They are divided by Pereira into five groups, viz.:

1. *Laxatives.*—A purgative is said to be laxative when it operates so mildly as merely to evacuate the intestines without occasioning any general excitement of the system, or any extraordinary increase of watery secretion from the capillaries of the alimentary canal. This group includes manna, sulphur, cassia pulp, castor oil, etc.; and purgatives of this kind are employed when we wish to evacuate the bowels with the least possible irritation, as in children and pregnant women; in persons suffering from hernia, piles, stricture or prolapsus of the rectum, etc.

2. ***Saline*** or ***Cooling Purgatives,*** such as sulphate of magnesia, and potassio-tartrate of

soda, either in simple solution or in the form of seidlitz powder (q.v.). They give rise to more watery evacuations than the members of the preceding group, and are much employed in inflammatory and febrile cases.

3. *Milder Acrid Purgatives*, such as senna, rhubarb, and aloes. They possess acrid and stimulating properties, and are intermediate in activity between the last and the next group. Senna (generally in the form of black draught) is employed when we want an active but not very irritant purgative. Rhubarb is especially adapted for patients when there is a want of tone in the alimentary canal. Aloes is used in torpid conditions of the large intestine; but as this drug irritates the rectum it should be avoided in cases of piles and of pregnancy, especially if there is any threatening of miscarriage.

4. *Drastic Purgatives*, such as jalap, scammony, gamboge, croton oil, colocynth, and elaterium, when swallowed in large doses, act as irritant poisons, and are employed in medicine when the bowels have resisted the action of milder purgatives, or when we wish to exert a powerful derivative action upon the intestinal mucous membrane (as in cases of apoplexy, when croton oil is commonly used), or when it is necessary to remove a large quantity of water from the system, as in dropsical affections, in which case, elaterium, from its hydragogue power, is usually employed.

5. *Mercurial Purgatives*, the chief of which are calomel, blue pill, and gray powder. They are commonly given with the view of increasing the discharge of bile, although their power in this respect has recently been denied. As their action is uncertain, they are usually combined with or followed by other purgatives. Podophyllin (q.v.) has recently been much used for the purpose of exciting bilious evacuations. Hamilton's book *On Purgative Medicines*, which was published more than half a century ago, is still the standard work on the subject of this article.

PURGATORY (Lat. *purgatorium*, from *purgo*, I cleanse), is the name given, in the Roman Catholic and Oriental churches, to a place of purgation, in which, according to their religious system, souls after death either are purified from venial sins (*péccata venália*), or undergo the temporal punishment which, after the guilt of mortal sin (*peccata mortalia*) has been remitted, still remains to be endured by the sinner. The ultimate eternal happiness of their souls is supposed to be secured; but they are detained for a time in a state of purgation, in order to be fitted to appear in that presence into which nothing imperfect can enter. As there is some obscurity and much misunderstanding on this subject, we shall briefly explain the doctrine of Catholics, as collected from authentic sources, distinguishing those things which are held by them as "of faith," from the opinions which are freely discussed in their schools. Catholics hold as articles of their faith (1) that there is a purgatory in the sense explained above, and (2) that the souls there detained derive relief from the prayers of the faithful and from the sacrifice of the mass. The Scriptural grounds alleged by them in support of this view are 2d Macc. xii. 43–46 (on which they rely, not merely on the supposition of its being inspired, but even as a simple historical testimony), Matt. xii. 32, 1st Cor. iii. 11–15, 1st Cor. xv. 29; as well as on certain less decisive indications contained in the language of some of the Psalms—as xxxvii. (in Auth. Vers. xxxviii.) 1, and lxv. 12. And in all these passages they argue not alone from the words themselves, but from the interpretation of them by the fathers, as containing the doctrine of a purgatory. The direct testimonies cited by Catholic writers from the fathers to the belief of their respective ages as to the existence of a purgatory, are very numerous. We may instance among the Greeks: Clement of Alexandria, *Stromata*, vii. 12; Origen, *Hom.* xvi. c. 5, 6 *in Jeremiam;* vi. *Hom. in Exod.;* xiv. *Hom. in Levit.;* xxviii. *Hom. in Numb.;* Eusebius, *De Vita Constantini*, iv. 71; Athanasius, *Quæst.* xxxiv. *ad Antioch.;* Cyril of Jerusalem, *Cat. Mystag.* v. 9; Basil, *Hom. in Psalm*, v. 7; Gregory of Nazianzen, xli. *Orat. de Laude Athanasii;* Gregory of Nyssa, *Orat. de Bapt.;* as also Epiphanius, Ephrem, Theodoret, and others. Among the Latins: Tertullian, Cyprian, Arnobius, Lactantius, Hilary, Ambrose, and, above all, Augustine, from whom many most decisive passages are cited; Paulinus of Nola; and Gregory the great, in whom the doctrine is found in all the fullness of its modern detail. The epitaphs of the catacombs, too, supply Catholic controversialists with some testimonies to the belief of a purgatory, and of the value of the intercessory prayers of the living in obtaining not merely repose, but relief from suffering, for the deceased; and the liturgies of the various rites are still more decisive and circumstantial. Beyond these two points, Catholic faith, as defined by the council of Trent, does not go; and the council expressly prohibits the popular discussion of the "more difficult and subtle questions, and everything that tends to curiosity, or superstition, or savors of filthy lucre." Of the further questions as to the nature of purgatory, there is one of great historical importance, inasmuch as it constitutes one of the grounds of difference between the Greek and Latin churches. As to the existence of purgatory, both these churches are agreed; and they are further agreed that it is a place of suffering; but, while the Latins commonly hold that this suffering is "by fire," the Greeks do not determine the manner of the suffering, but are content to regard it as "through tribulation." The decree of union in the council of Florence (1439) left this point free for discussion. Equally free are the questions as to the situation of purgatory; as to the duration of the purgatorial suffering; as to the probable number of its inmates; as to whether they have, while there detained, *a certainty* of their ultimate salvation; and whether a "particular judgment" takes place on each individual case immediately after death.—See Bellarminus, *De Purgatorio;* Suaresius, *De Purgatorio;* and on the Greek portion of the subject, Leo Allatius, *De utriusque Ecclesiæ in Dogmate de Purgatorio perpetua Consensione.*

The mediæval doctrine and practice regarding purgatory were among the leading grounds of the protests of the Waldenses and other sects of that age. The reformers, as a body, rejected the doctrine.

What is called the "historical," or critical view of its genesis, is well given by Neander (*Dogmengeschichte*, vol. i.). He conceives that its source is to be sought for in the ancient Persian doctrine of a purifying conflagration which was to precede the victory of Ormuz, and consume everything that was impure. From the Persians it passed with modifications to the Jews, and from them found its way into the ethical speculations of the more cultivated Christians. It harmonized admirably with the wide-spread philosophical notion borrowed by the Gnostic Christians from Neo-platonism, that matter is inherently evil. If, then, the *body* was to rise, it must be purged of evil, and the instrument of purification—fire—was at hand for the purpose. Moreover, the high and pure conception of the character of God revealed in the New Testament, necessitating a corresponding moral excellence on the part of his worshipers—"without holiness shall no man see the Lord"—must have greatly assisted in the establishment of the doctrine, for how could men, only lately gross heathens, possessing yet but the rudiments of the new faith, and with most of their heathen habits still clinging about them, be pronounced "holy," or "fit for the presence of God?" Their "faith" in Christ was sufficient to save them, but the work of sanctification was incomplete when they died, and must go on. Probably it was a strong Christian feeling of this sort that determined the reception of the doctrine of purgatory into the creed of the Catholic church, rather than any Gnostic philosophizings, though the Neo-platonic divines of Alexandria are the first to mention it.

Protestants generally reply to the arguments of Roman Catholics on the subject of purgatory, by refusing to admit the authority of tradition or the testimonies of the fathers, and at the same time by alleging that most—if not all—of the passages quoted from the fathers, as in favor of purgatory, are insufficient to prove that they held any such doctrine as that now held by the Roman Catholic church, some of them properly relating only to the subject of prayer for the dead, and others to the doctrine of limbus (q.v.). That the doctrine of purgatory is the fair development of that which maintains that prayer ought to be made for the dead, Protestants generally acknowledge, but refuse to admit, that the fathers carried out their views to any such consequence. As to the alleged evidences from Scripture, they are commonly set aside by Protestants as merely ridiculous. The much-vaunted argument from the second book of Maccabees, is of course contemned, as being from an apocryphal book, and not one of the best books of the Apocrypha; besides, that the passage relates to nothing more than prayer for the dead. The text Matt. xii. 32 is explained as relating to the final judgment; and 1 Cor. iii. 11–15, as relating to a trial of *works*, and not of persons; while 1 Cor. xv. 29 is regarded as having nothing more to do with the subject than any verse taken at random from any part of the Bible.

PURGING NUT. See Physic Nut.

PURIFICA'TION, in a biblical sense, is the act through which an individual became fit to approach the Deity, or to mix freely in the community, in cases where a certain bodily or other disability had kept him out of the pale of the latter. The purification consisted chiefly in expiations, ablutions, sometimes accompanied by special sacrifices. Priests and Levites were consecrated for the divine service by "purification;" proselytes had to undergo it at baptism; and special religious acts could only be performed by those who had "bathed their bodies." Generally, no one was allowed to enter the temple or synagogue without having washed or "sanctified" himself; and in the post-exilian period, bathing was considered (chiefly by the Pharisees and Essenes) as one of the chief duties of piety. In general, the Mosaic law distinguishes between "clean" and "unclean" persons as well as things, calling "unclean" all that with which an Israelite is not to come in contact. It has been erroneously assumed that all the Levitical laws of purity and purification have a physical or medical reason—that is, that infection was to be prevented through them; but this can only have been the case in some instances. At the same time, we cannot deny that we are at a loss for the general principle on which they were based. There can be no doubt that cleanness, like every other virtue, if not enforced on religious grounds, would have had few devotees in those days, and among an eastern people; while, again, a hot climate requires a much greater attention to outward purity than more temperate zones. Compared with the Indian and Persian laws in this respect, the Jewish ones seem much less minute and harassing. For the purification from the severer kinds of uncleanness, a certain "water of uncleanness" (Lev. xv.) was prepared; and the different acts to be performed for the re-admission of the leper into the community (Lev. xiv. 4–32), show plainly that his was considered the last stage of impurity. Identical with the first stage of the leper's purification are the ceremonies to be performed in the case of infected houses and garments. The sixth Seder of the Mishnah, in 11 treatises (there is no Gemara to this portion, except to Niddah), contains the most detailed regulations (as fixed by tradition) on this point. The washing of hands, we may add in conclusion, was in later times considered ritually necessary, in accordance with the Talmudical maxim, that "every table should properly be sanctified into an altar." See UNCLEANNESS.

All the Jewish ceremonial purifications are commonly regarded by Christian theologians as emblematic of the necessity of holiness in the people of the Lord, and particularly in all acts of worship.

PURIFICATION OF THE BLESSED VIRGIN MARY, FEAST OF, a festival in commemoration of the "purification" of the Blessed Virgin Mary, in accordance with the ceremonial law of Lev. xii. 2. This ceremony was appointed for the fortieth day after childbirth, which, reckoning from Dec. 25 (the nativity of our Lord), falls upon Feb. 2, on which day the purification is celebrated. The history of Mary's compliance with the law is related in Luke ii. 22–24; and as on the same occasion she complied also with the law of Numb. xviii. 15, by the offering prescribed in redemption of the first-born, the festival is also called by the name of the "Presentation of the Child Jesus," or the "Feast of Simeon," and sometimes, also, "of the Meeting" (*occursus*), in allusion to Simeon's meeting the Virgin mother, and taking the child into his arms (Luke ii. 25). The date of the introduction of this festival is uncertain. The first clear trace of it is about the middle of the 5th c., during the reign of Marcia, and in the church of Jerusalem. Its introduction in the Roman church in 494 was made, by pope Gelasius, the occasion of transferring to a Christian use the festivities which at that season were annexed to the pagan festival of the Lupercalia.

PURIM, the festival instituted by Mordecai at the suggestion of Esther, to commemorate the deliverance of the Jews in Persia from the massacre with which they were threatened through the plots of Haman. The Hebrew word signifies *lot*, and the festival was probably called Purim in irony, Haman having cast lots to ascertain the auspicious day for executing the bloody decree of the king. The festival is observed on the 14th and 15th of Adar. According to modern custom the previous day is kept as a fast-day, called the fast of Esther. Some fast three days, as Esther first enjoined. As soon as the stars appear on the evening of the 14th candles are lighted in token of rejoicing, and the people assemble in the synagogue. After a short prayer and thanksgiving the book of Esther, written on a separate parchment called Megillah, is read through. When the name Haman is read the congregation cry out, "May his name perish!" and the children spring rattles and make other noises. When the reading of the Megillah is finished the whole congregation exclaim, "Cursed be Haman; blessed be Mordecai; cursed be Zoresh (wife of Haman); blessed be Esther; cursed be all idolators; blessed be all Israelites; and blessed be Harbonah, who hanged Haman." In the morning service in the synagogue is read the law which relates the destruction of the Amalekites, the supposed ancestors of Haman. The rest of the day is spent in festivity, sending presents to one another, and bestowing alms on the poor, followed by plays and masquerades.

PU'RITANS, a name first given, according to Fuller in 1564, and according to Strype in 1569, to those clergymen of the church of England who refused to conform to its liturgy, ceremonies, and discipline as arranged by archbishop Parker and his Episcopal coadjutors. But in point of fact, the puritan tendency in the church of England is as old as the church itself; and to seek for its true origin we must go back to the period of Cranmer, who, when laying the foundations of English Protestantism in a nation only half-prepared for the change, found it necessary to make concessions to the older religion, and to build the new church on an elaborate system of compromise. This feature of "Anglicanism"—its essential *broad-churchism*—gave great offense to the stricter and more doctrinal of the English reformers, who neither cared nor were competent to look at the thing from a statesman's point of view. The reign of Edward VI., brief though it was, showed quite clearly that if the party in the English church who had acquired not only their theology, but their opinions of church government from Calvin, ever got the upper hand, they would not stop till they had reconstructed, on a much simpler basis, the whole ecclesiastical fabric. The reaction under Mary drove most of them to seek safety in exile on the continent. It was here the first definite step in the history of puritanism was taken. A number of the exiles resident at Frankfurt determined to adopt the Genevan service-book in preference to that appointed by king Edward, and though their attempt proved a failure, partly on account of the opposition of others of the exiles, yet it showed the pertinacity with which they tried to carry their convictions into practice. On their return to England, after the accession of Elizabeth, the struggle was renewed. But the virile queen would not tolerate their notions, and during her whole reign punished in the most stringent style all who refused to obey the Episcopal ordinances. The position assumed by the puritans was that the liturgy, ceremonies, and discipline of the church of England required further reformation; that the church, as then constituted, did not separate itself markedly enough from Roman Catholicism; and that it was desirable, in the interests of religion, to abandon everything that could boast of no other authority than tradition or the will of man, and to follow as far as possible the "pure" word of God. Hence their name, which was probably given in derision. In spite of the sharpest repressive measures their principles gradually spread among the serious portion of the laity, who were also called puritans. But the name appears not to have been confined to those who wished for certain radical changes in the forms of the church. The character that generally accompanied this wish led naturally enough to a wider use of the term; hence, according to Sylvester, "the vicious multitude of the ungodly called all puritans that were strict and serious in a holy life, were they ever so conformable." This is the sense in which the Elizabethan dramatists use the word. From this very breadth of usage one sees that there were different degrees of puritanism. Some would have been content with a moderate reform in the rites, discipline, and liturgy of the church; others (like Cartwright of Cambridge) wished to abolish Episcopacy altogether, and to substitute Presbyterianism; while a third party, the Brownists or Independents (q.v.), were out-and-out dissenters, opposed alike to Presbyterianism and Episcopacy. During the reigns of James I. and Charles I. the spirit of puritanism continued more and more to leaven English society and the English parliament, although the most violent efforts were made by both monarchs to extirpate it. The tyrannical proceedings of Laud and of the Laudian bishops, and the outrages practiced by Charles on the English constitution, led many who were not at all Genevan in their ideas to oppose both church and king for the sake of the national liberties. Hume distinguishes three kinds of puritans: 1, The *political puritan*, who disliked the bishops, not so much on ecclesiastical grounds, as on account of their servility toward the king, and their priestly antipathy to civil liberty; 2, The *puritans in church discipline*, who were for the most part in favor of Presbyterianism; 3, The *doctrinal puritans*, who were strong Calvinists on such points as predestination, free-will, grace, etc., but were not opposed to Episcopacy or to the ecclesiastical authority of the monarch, and who contented themselves with assailing the Arminianism that was encouraged at court. The attitude of this third class was certainly anomalous, and it is not wonderful that they exercised so little influence or control on the march of events in the great civil struggle. The second class was by far the most numerous—at least among the clergy; and at first it seemed as if the clergy were going to have things all their own way. For example, in the memorable "Westminster assembly of divines" (1643), the great majority of the ministers were Presbyterians, and their *Confession of Faith* is quite a Presbyterian affair. But genius, energy—the arms of victory—belonged to the more advanced puritans, who were predominant in the army and the parliament, and ultimately triumphed in the person of Cromwell (q.v.). But the restoration (1660) brought back Episcopacy, and the act of uniformity (1662) threw the puritans of the church into the position of dissenters. Their subsequent history is treated under the different forms of dissent. Before the civil war broke out, so great were the hardships to which the puritans were exposed that many of them emigrated to America, to seek liberty and peace on the solitary shores of the new world. There they became the founders of the New England states, and cultivated unmolested that form of Christianity to which they were attached. Nowhere did the spirit of puritanism in its evil as well as its good more thoroughly express itself than in Massachusetts and Rhode Island; nor have its traces wholly disappeared even yet. In Scotland puritanism, in the shape of Presbyterianism, was from the first the established religion; hence it does not present itself to us in that country as a struggling, suffering, antagonistic, and protesting force; nor, in point of fact, was the name of puritan ever given even to the extremest sect of Covenanters.—See Neale's *History of the Puritans; Price's History of Nonconformity;* Macaulay's *History of England;* and *Dr. Stoughton's Works.*

PURL, a beverage now little used except among the lower classes in and around London. It is made by warming a pint of ale with a quarter of a pint of milk, and adding some sugar and a wine-glassful of gin, rum, or brandy.

PURLINS, pieces of timber used in framed roofs between the principals, for the support of the common rafters.

PURMEREND, a flourishing little t. in n. Holland, 10 m. n. of Amsterdam, and on the line of the great canal from that city to the North sea. Pop. '75, 4,783. It has a large trade in cheese, butter, eggs, cattle, and wood, upward of 1,500,000 lbs. of cheese being annually sold in the market. In the neighborhood of Purmerend are to be found the richest meadows, the finest cattle, the neatest farm-houses, and the most perfect dairies and cow-stables. Purmerend has also a considerable shipping trade, and imports timber. The town, which sprang up under the protection of the castle of Purmerstein (built at the beginning of the 15th c.), derives its name from being situated at the end of the Purmer, formerly a sheet of water, by drainage made a fertile tract of land containing 6,701 acres.

PURNEAH, a large t. of British India, capital of an extensive and populous district of the same name in the presidency of Bengal, on the n. bank of the Ganges, stands on both banks of the Little Kosi river, 230 m. n.n.w. of Calcutta. It covers a considerable area, but it is not compactly built, there being numerous plantations, gardens, and other open places within the boundaries. Around the town are numerous straggling villages. A considerable quantity of indigo is grown in the vicinity. The civic establishment consists for the most part of Europeans. Pop. '72, of town, 16,057; of district, 1,714,795.

PURPLE OF CASSIUS, or GOLD PURPLE, a beautiful coloring material of a vitreous character, which was made known in Germany in the 17th c. by an artist named Andrew Cassius, whose father was secretary to the duke of Sleswick. Its property is to give a beautiful ruby red to glass, and it was therefore, and still is, employed to make imitation rubies. It is made by combining one part of neutral chloride of gold with a mixture of one part of protochloride and two parts of perchloride of tin, all in solution. When mixed together, a beautiful purple precipitate is the result, which is the purple of Cassius. The French recipe, which is said to be the best, is 10 parts of acid chloride of gold dissolved in 2,000 parts of distilled water. To this add a solution, carefully prepared, in another vessel, of 10 parts of pure tin in 20 parts of muriatic acid diluted with 1000 parts of water. On mixing the two, the purple precipitate is thrown down, and is separated by filtering and decantation.

PURPLE COLORS. Painters in oil and water colors produce the various shades of purple by the admixture of pure red and pure blue colors. Dyers obtain this color from various sources, all of which are curious and interesting. From a very early period, purple has been one of the most highly prized of all colors, and came to be the symbol of imperial power. Probably one great reason for this was the enormous cost of the only purple color known to the ancients, the Tyrian purple, which was obtained in minute quantities only from a Mediterranean species of molluscous animal or shell-fish, the *murex trunculus*, and perhaps also *purpura lapillus*. In the time of Cicero, wool double-dyed with this color was called *dibapha*, and was so excessively dear, that a single pound-weight cost a thousand denarii, or about £35 sterling. A single murex only yields a small drop of the secretion, consequently very large numbers had to be taken in order to obtain enough to dye even a small amount of wool. Tarentum, the modern Otranto, was one of the great murex fisheries of the Romans, and there they had a number of large dyeing establishments. Vast heaps of the shells have been discovered there, the remains of its former industry. With the decline of the Roman empire, the employment of this purple color ceased, and it was not until a Florentine of the name of Orchillini discovered the dyeing properties of the lichen now called orchella weed, that a simple purple color was known in Europe. The discovery was kept secret in Italy for nearly a century, and that country supplied the rest of Europe with the prepared dye, which received the name of orchil or archil (q.v.). The color was very fugitive, and soon ceased to be used by itself; it, however, was found very useful in combination, and has a remarkable power of brightening up other colors. Many improvements have been lately made in archil dyeing, especially in fixing it. Its value, however, has been greatly lessened by the discovery of the beautiful series of purples yielded by coal-tar as results of the combination of one of its products called aniline with other bodies. See DYEING.

PURPLE EMPEROR, *Apatura iris* or *Nymphalis iris*, one of the largest of British butterflies, and one of the most richly colored. The expanse of wings is from 2¼ to 3¼ inches. The wings are strong and thick, and the flight more sustained than that of many butterflies. The purple emperor is very often to be seen about the tops of oak-trees.

PURPLES. See EAR-COCKLES.

PURPLE WOOD, or PURPLE HEART, the heart-wood of *Copaifera pubiflora* and *C. bracteata*, a very handsome wood of a rich plum color. The trees producing it are natives of British Guiana, where the wood is called generally *mariwayana*. The trees are rather rare on the coast, but in the upland forests are common. The chief interest of the wood is its remarkable adaptation to the purposes of artillery and fire-arms. It is said no wood is better adapted for mortar-beds and gun-carriages, as it sustains better than any other the violent concussions to which they are subjected. Its chief use in this country has been for making ramrods for muskets. Its great beauty and smooth grain would insure its extensive employment in cabinet-work in this country, if it were better known.

PUR'PURA, a genus of gasteropodous mollusks, of the family *buccinidæ*. The species are very similar to those of the genus *buccinum* (see WHELK), but have a less elongated shell, and a flattened columella, which is pointed at the base, and forms there, with the outer lip, a canal excavated as a notch in the shell, and not projecting. The species are numerous, mostly natives of the shores of warm climates. *P. lapillus* is a species pretty common on most parts of the British coast. It is smooth and whitish, with bands of reddish-brown, and sometimes 2 in. long. It feeds on mussels and other mollusks, boring their shells with its proboscis. The genus is interesting, because some species of it were amongst those which yielded the famous *Tyrian purple* of the ancients. *P. patula* is supposed to have been one of those from which this dye was obtained, but it may have been obtained from others, as *P. lapillus*. The dye is contained in a small vein-like sac near the head. See PURPLE COLORS.

PURPURA, or THE PURPLES, is a malady which is often erroneously placed among the diseases of the skin. It is in reality a blood disease, and is characterized by the appearance of small round spots, of a deep purple color, which are seen first and most abundantly on the legs, and afterward extend to the arms and trunk. They are accompanied by no local pain, are not effaced by pressure (being due to a drop of blood extravasated beneath the cuticle, or in the structure of the skin itself), do not rise above the surrounding surface, and are sometimes intermixed with livid patches resembling bruises; and, before disappearing, both the round spots and the patches undergo the same change of color which a bruise undergoes. These spots are not peculiar to the skin, but occasionally occur upon internal surfaces, and in the tissues of viscera. Passive hemorrhages from the mucous membranes frequently accompany the external symptoms. There is usually much debility, and often a great tendency to faintness. The duration of the disease varies from a few days to a year or more. Slight cases are devoid of danger, and even the hemorrhagic cases usually recover, unless the bleeding has been excessive, or the blood has been extravasated into a vital organ.

The causes of this disease are obscure. The mode of treatment varies in different cases, but the main indication always is to correct the condition of the blood. When there is reason to believe that the disease is dependent upon depressing influences, a nutritious diet, tonics, and stimulants are required; and chalybeates, or the mineral acids, and quinine, with plenty of exercise in the open air, should be prescribed. When, however, there is no evidence of the operation of any debilitating cause, and the pulse is hard, the most efficient treatment consists in abstinence, venesection, and purgatives. In cases of a mixed nature, a mixture of the oil of turpentine and castor-oil, in free doses (2 drams of the former to 5 or 6 drams of the latter), and iced drinks, or the sucking of small pieces of ice, have been strongly recommended. If the hemorrhage is not stopped by the oil of turpentine, gallic acid, or acetate of lead and opium, must be prescribed; and if it proceeds from accessible parts, local measures, such as the employment of ice or strong astringents, should also be employed.

PUR'PURE, in heraldry, the color purple, expressed in engravings by lines in bent sinister. It is of unfrequent occurrence in British heraldry.

PURPURINE ($C_{14}H_8O_5 = C_{14}H_5(OH)_3O_2$)"; discovered by Robiquet and Colin in 1828; named also *madder-purple*, *oxyalizarine*, and *trioxyanthraquinone*. Produced from a vegetable source, madder, and existing therein as a glucoside, it requires for its extraction as a separate dye the operation of mineral chemicals; it is included, in its glucoside form, in the *rubian* of Schunck, an amorphous mixture of glucosides (see RUBIAN and ALIZARINE); but it is distinctly separate from the crystalline ruberythric acid of Rochleder, which is the alizarine glucoside. It is found also in combination with munjistine, in munjeet. The purpurine glucoside itself has not yet been isolated, being very unstable. As a dye-stuff and in calico-printing, purpurine, with alumina mordants, yields bright reds; with iron, a grayish violet. Resisting cleaning with soap and nitromuriate of tin fairly well, they are yet not so permanent against washing and light as alizarine colors. When using madder, garancine, etc., on calicoes, some dyers consider the purpurine nearly useless, but others contend for its necessity to particular shades of pink and red. Robiquet and Schunck assert that the finest madder colors are due to alizarine: this is supported by Kopp, who decides the basis of Turkey-red, an important dye, to be alizarine; stating that purpurine, while dying mordánted cloth perfectly, is unstable compared with alizarine, and does not so readily "take" on oiled cloth. *Optical Properties.*—According to Stokes, the spectroscope determines the existence of purpurine, from the two dark bands in the green, in its solution in alkaline carbonates; as also those in ether and alum, the last being delicately fluorescent. The carbonate of soda solution secures enough purpurine from a square inch of dyed cloth to exhibit its reaction. Alizarine yields different spectroscopic absorption bands, and also is known from purpurine by forming violet solutions with alkalies and alkaline carbonates, the solutions remaining unchanged in air; while purpurine would be destroyed by oxidation. *Properties.*—Purpurine, slightly soluble in boiling water, giving a rose-color solution, dissolves in alum, not separating even from a concentrated solution, and presents a beautiful fluorescence, and appears as a red, feathery, crystalline powder by sublimation, and deposits in orange-red needles from boiling alcohol. In sulphuric acid of 400° Fahr. temperature it is unchanged, and precipitates from its solution if thrown into water. In nitric acid, if boiled, it changes to phthalic and oxalic acid. Other solvents are ether, benzol, glycerine, acetic acid, and ammonia, in which it forms *purpuromide* or purpurine ($C_{14}H_5NH_2(OH)_2O_2$) on standing or on the application of heat; precipitating then in deep violet flocks on the addition of an acid. In alkaline hydrates and carbonate its solutions are cherry or poppy red, and acids reprecipitate it in orange yellow flocks; and in alkaline hydrates it oxidizes and disappears on standing in air, so decolorizing the solution. A mixture of purpurine and caustic soda solution with some ether yields sodic purpurate in crystals. Its basic, calcic, and aluminic lakes are soluble in boiling carbonate of soda solution. Heated with zinc dust, it forms anthracene ($C_{14}H_{10}$). Bolley claims to have changed it to alizarine by a heat of 410° Fahr. applied to tubes containing it. Martin of Avignon claims that it and its chief compounds are convertible into alizarine by adding zinc dust to a sulphuric acid solution, and precipitating in water. (See Calvert's *Dyeing and Calico Printing*, Lond. 1876, p. 38.) Rosenstiehl, with various reducing agents, got only purpuro-xanthin, not alizarine. *Preparation.*—Identical in its extraction from madder, with alizarine purpurine more easily dissolves in solution of alum, and is thus extracted. Several methods of preparation are known. Kopp's, worked commercially at Strasburg, extracts the madder with aqueous sulphuric acid, and decomposes the glucoside of purpurine; precipitating the dye free from alizarine, by adding 3 to 5 per cent of sulphuric acid and heating to 86° to 104° Fahr.; leaving unaltered the ruberythric acid, only changeable by a higher temperature. Schützenberger and Schiffert found in crude purpurine about 75 per cent pseudo, 12½ purpurine, 12½ orange matter, and one-fifth of one per cent purpuro-xanthin; Schunck claims these to be mixtures of separate bodies, especially the orange; considered a close resemblance to rubiacine. Rosenstiehl confirms this. F. de Lalande changes alizarine to purpurine by treatment in sulphuric and arsenic acid or manganese dioxide; purifies its precipitate in water, with alum; claiming to have so proved, that its single atomic difference of oxygen from alizarine does not come from a hydroxyl group; therefore, that purpurine is oxyalizarine. The attempted artificial formation of purpurine from alizarine sulphuric acid, by its fusion with potassic hydrate, is a failure. See MADDER, *ante.*

PURPURINE, PSEUDO ($C_{14} H_8 O_6 = C_{14} H_4 (OH)_4 O_2$), (for mode of production, see PURPURINE); first discovered by Schützenberger and Schiffert, from Kopp's purpurine, in which, as three-fourths, it constitutes the chief ingredient. Almost insoluble, in even boiling alcohol, it yields to hot benzol, and crystallizes from the solution in brick-red crystalline needles. A high temperature either in sublimation or in alcohol at 200° C., in sealed tubes, produces purpurine, its original source (so pointing to a merely mechanical change ?). According to Rosenstiehl, it yields to mordanted cotton, but only when in distilled water, shades of color approaching and so continuing the series of shades from alizarine. Prepared from madder alone, its source is vegetable; but in dye-house practice, it is found as a calcic lake in the refuse of the dye-beck.

PURPURO XANTHINE, ($C_{14} H_8 O_4$) from Kopp's purpurine, as one-fifth of one per cent; and first prepared by Schützenberger and Schiffert as a yellow body, isomeric with alizarine, and dyeing alumina mordanted cloths a dull evanescent yellow. It is readily soluble in alcohol and benzol, sublimes without decomposition. It is easily produced from purpurine or pseudo purpurine by their reduction in aqueous PI_3, in a temperature of 180°C.; or by solution in sodic hydrate, adding stannous chloride till change of the previous red color to yellow; and precipitating by any acid.

PURRE. See DUNLIN.

PURSE-CRAB, *Birgus*, a genus of *crustacea*, of the order *decapoda*, and sub-order *anomoura* (see CRAB), allied to hermit-crabs (q.v.), but having the abdomen or *tail* shorter and almost orbicular, its under surface soft and membranous, its upper surface covered with strong plates, which overlap one another as in lobsters. The first pair of legs have large and powerful pincers; the pair of legs nearest the abdomen are very small, but terminated by rudimentary pincers; the pair next to them larger, with small pincers; the second and third pair of legs are terminated by a single nail. A species of purse-crab (*B. latro*) is found in Mauritius and in the more eastern islands of the Indian ocean. It is one of the largest of crustaceans, sometimes two or three feet in length when fully stretched out, and capable of erecting itself to the height of a foot from the ground, which it readily does if irritated, retreating backward, and exhibiting to the utmost its powers of offense or defense. It is of a yellowish-brown color, its limbs covered with little blackish projections. It is never found far from the sea, to which it is said to pay visits, in order to moisten its gills; but it resides on land, and often in holes under the roots of trees, where it accumulates great quantities of the fibers of the cocoa-nut husk, as if to keep itself warm, or for a soft bed. The Malays rob these stores to supply themselves with junk. The gills of the purse-crab are contained in a very large cavity, of which they fill only a very small part. Its food consists of cocoa-nuts and other nuts, which it climbs trees to procure. Its manner of dealing with a cocoa-nut is described as exhibiting a remarkable instinct, as it always begins to tear off the husk at the end where the *eyes* are. It is variously stated that it makes a hole through the eye from which the nut would germinate, and then scoops out the nut with the small pincers of its fourth pair of legs; and that having made this hole, it seizes the nut by one of its great pincers, and breaks it against a stone. Both statements may perhaps be true.

PURSER, in the royal navy, was formerly a warrant, and subsequently a commissioned officer, in charge of the provision, clothing, pay, and necessaries of a ship-of-war. His title was changed in 1844 to that of paymaster (q.v.).

PURSLANE, *Portulaca*, a genus of plants of the natural order *portulaccæ*, having a bifid calyx, 4 or 6 petals, 8 or 16 stamens, and a capsule dividing around the middle. COMMON PURSLANE (*P. oleracea*) grows in cultivated and waste grounds on the sea-shore, in almost all tropical and sub-tropical parts of the world. It is cultivated as a pot-herb. It is a short-lived annual, with spreading and rather procumbent stems, and obovate fleshy leaves, which, as well as the young shoots, are frequently used in salads. The young and tender shoots are pickled in France like gherkins. Purslane is not so common in British gardens as it once was.

PURSUIVANT (Fr. *poursuivant*, follower), the third and lowest order of heraldic officers. The office was instituted as a novitiate, or state of probation through which the offices of herald and king-at arms were ordinarily to be attained, though it has been held that a herald or king-at-arms may be made *per saltum*. There are four pursuivants belonging to the English college of arms: *Rouge croix*, the oldest, so named from the cross of St. George; *blue-mantle*, instituted either by Edward III. or Henry V., and named in allusion to the robes of the order of the garter, or perhaps to the color of the arms of France; *rouge dragon*, deriving his title from king Henry VII.'s dexter supporter, a red dragon, assumed in allusion to his descent from Cadwaladyr; and *portcullis*, named from a badge of the same monarch. There are six pursuivants in the heraldic establishment of Scotland, known by the names of *Dingwall, Bute, Carrick, Ormond, Kintyre*, and *Unicorn*—titles which, as well as those of the heralds, seem to have originated in the reign of James III. The Scottish pursuivants take precedence according to seniority in office.

In ancient times, any great nobleman might institute his own pursuivant with his own hands and by his single authority. The dukes of Norfolk had a pursuivant, called *blanch-lyon*, from the white lion in their arms; the pursuivant of the dukes of Northumberland was styled *espérance*, from the Percy motto; and Richard Nevil, earl of Salisbury, had a pursuivant called *egle vert*. We even find sir John Lisle in 1442 making Thomas de Launey his pursuivant, by the title of *blanch sanglier*. The ancient costume of a pursuivant of the king was a surcoat, embroidered with the royal arms, and worn with one sleeve hanging down in front, and another behind. In 1576 rouge croix was severely censured for wearing his coat as a herald. In later times, however, a pursuivant's coat is worn exactly as a herald's, the latter officer being distinguished by the collar of SS.

PURÛRAVAS, a celebrated legendary king of ancient India. According to tradition, he was a son of the planet Budha, or Mercur, by Ilâ—a name of the earth, a prince renowned for liberality, devotion, magnificence, truthfulness, and personal beauty; but still more so on account of his love for the Apsaras Urvas'î. This heavenly nymph having incurred the imprecation of some gods, and therefore having been compelled to descend from heaven, saw Purûravas, and was seen by him. The king having, in consequence, fallen in love with Urvas'î, she consented to return his affection, on the condition that he would never suffer two rams, which she loved as children and always kept near her bedside, to be carried away from her, and also that he should never be seen by her undressed. To these terms the king gave his assent; but the Gandharvas, the choristers in Indra's heaven, and the husbands of the Apsarasas being jealous of Purûravas, instigated one of their tribe to carry away one of the rams during the night; and after he had accomplished their design, other Gandharvas came and stole the second ram. Upon this Purûravas highly incensed, and trusting that the nymph would not see his person as it was dark, rose in pursuit of the robbers. At that moment, however, the Gandharvas caused a flash of lightning to irradiate the scene, and Urvas'î beheld the king undressed. The compact was violated, and Urvas'î disappeared, while the Gandharvas abandoning the rams, departed to the sky. Purûravas recovered the animals, but could find Urvas'î nowhere. Like one insane, the king now wandered over the world until he saw her at Kurukshetra, sporting with four other nymphs of heaven in a lake beautified with lotuses. Urvas'î, however, told him to keep away from her until, at the end of the year, she should be delivered of the son with whom she was pregnant by him. He obeyed; and after Ayus was born, these annual interviews between Purûravas and Urvas'î were repeated, until she had born him five other sons—Dhîmat, Amâvasu, Viswâvasu, S'atâyus, and S'rutâyus. But the king, now longing for an uninterrupted reunion with his wife, Urvas'î endeavored to propitiate the Gandharvas who had caused their separation. Her efforts were successful; and they taught the king how to produce by attrition from the wood of the fig-tree, a sacrificial fire, and how to divide it into the three fires required for sacrificial acts. By this means they enabled him then to celebrate many sacrifices, and, by virtue of these, to be transferred to the sphere where Gandharvas and Apsarasas dwell together. This legend is adverted to in the Vedas, and related with more or less detail in the *Mahâbhârata* and the *Purân'as* (see, for instance, Wilson's *Vishn'u-Purân'a*); it is likewise the subject of the celebrated drama of Kâlidâsa, the *Vikramorvas'î*, where, however, the incidents that, according to the *Purân'as*, cause the separation of Purûravas and Urvas'î, are not mentioned by the poet, her disappearance being ascribed by him to a fit of jealousy, in which she trespassed on the proscribed bounds of a divine hermitage. It deserves notice, too, that in the drama, Urvas'î is transformed into a creeper, and discovered in that condition by Purûravas, when frantically roaming in search of her in the forest of Akalusha—a transformation pointing to some affinity between this latter myth and that of Daphne when pursued by Apollo.—The idea, however, on which the original Hindu myth is based—apart from the semi-historical and fantastical detail by which it was overgrown—seems to have been suggested by the (supposed) motion or wanderings (Purûravas, from *puru*, much, and *ravas*, going—from *ru*, go, move) of the sun (*Gandharva*, in the Vedas, also being a personification of the fire of the sun), attracting or absorbing, and thus uniting, as it were, with the vapors floating in the sky (*Apsaras*—from *ap*, water, and *saras*, going, arising, hence "water-born"—being originally "personifications of the vapors which are attracted by the sun, and form into mists or clouds;" see Goldstücker's *Sanskrit Dictionary*, under "Apsaras;" and Urvas'î, from *uru*, large, wide, and *as'*, pervade, hence "the far-pervading"—being identified in one passage of the *Mahâbhârata* with the river Ganges). A Greek myth of a kindred character is that of Apollo and Daphne, and also that of *Io*, according to the ingenious interpretation of it by prof. P. W. Forchhammer, in the *Verhandlungen der Versammlung deutscher Philologen in Frankfurt*, 1862. In his *Hellenica*, the same scholar has moreover shown that in Greek mythology the ram is a symbol of the cloud.

PU'RUS, a river rising in mountains e. of Cuzco, Peru, and flowing through Peru. Bolivia, and Brazil until it empties into the Amazon. It has in all five mouths, the two most distant being more than 100 m. apart. Its length is about 2,000 m., its general direction is n.e , and it is navigable for a considerable distance. The region through which it flows abounds in the tropical fauna and flora, and has as yet been but partly explored.

PURVEY'ORS, ARMY, were officers charged with superintending the civil affairs of army hospitals, as the payment of men, procuring provisions, medical comforts, bedding, etc. The purveyor acted independently of the medical officer, and was responsible through the purveyor-in-chief to the secretary of state for war. The department consisted of a purveyor-in-chief, principal purveyors, purveyors, deputy-purveyors, and clerks. The purveyor-in-chief ranked with a colonel in the army, and had a salary of £547 per annum, rising to £730 after long service. In 1868 the department was merged with others in the control department; and on the abolition of the latter in 1875 its functions passed to the commissariat and transport department.

PUS is a well-known product of inflammation, and occurs as a thick yellow creamy fluid, differing from all other morbid exudations in containing a large number of corpuscles, having a soft and fatty feeling when rubbed between the fingers, a peculiar odor, usually an alkaline reaction, and a specific gravity of about 1.032. Like the blood, it consists of certain definite microscopic elements, and of an intercellular fluid or serum in which they swim.

The microscopic elements are: 1. The pus-corpuscles, which, both in their microscopical and chemical relations, seem to be identical with the lymph-corpuscles, or colorless blood-cells: in diameter, they range from 0.004 to 0.005 of a line, and each corpuscle consists of a cell-wall, which often appears granular, of viscid transparent contents, and of a nucleus which is adherent to the cell-wall, and which can be rendered much more apparent by the addition of acetic acid. 2. Molecular granules, and 3. Fat-globules. The serum of pus is perfectly,clear, of a slightly yellow color, and coagulates on heating into a thick white mass.

The chemical constituents of pus are water (varying from 769 to 907 in 1000 parts), albumen (from 44 to 180); fats (from 9 to 25); extractive matter (from 19 to 29); and inorganic salts (from 6 to 13); in addition to which, mucin, pyin, glycin, urea, etc., are occasionally present. Of the inorganic or mineral constituents, the soluble salts are to the insoluble in the ratio of 8 to 1, and the chloride of sodium (the chief of the soluble salts) is three times as abundant as in the serum of the blood. The mode of formation of pus is described in the article SUPPURATION.

PUSEY, Rev. EDWARD BOUVERIE, D.D., regius professor of Hebrew at Oxford, and canon of Christ-church, a celebrated English divine, and one of the chief promoters of the High church movement in the church of England. He is the second son of the honorable Philip Bouverie (younger brother of the first earl of Radnor, who assumed the name of Pusey), by lady Lucy Sherard, eldest daughter of Robert, fourth earl of Harborough. He was born in the year 1800, was educated at Eton, and thence proceeded to Christ-church, where he obtained a first class in classics in 1822, and gained the university prize for a Latin essay in 1824. He was afterwards elected fellow of Oriel; and in 1828 succeeded Dr. Nicoll in the regius professorship of Hebrew, to which a canonry at Christ-church is annexed.

Dr. Pusey's first publication was on the *State of Religion in Germany*, the result of a visit to that country, which appears to have greatly influenced his subsequent course, and led him to devote himself to resist the progress of rationalism. In 1835 he became a contributor to the *Tracts for the Times* (in union with Messrs. J. H. Newman, Keble, Williams, etc.), of which Nos. 67, 69, *On Holy Baptism*, and Nos. 18 and 66, *On the Benefit of Fasting*, were written by him (see TRACTARIANISM). He was also one of the editors of the *Library of the Fathers*, and of the *Library of Anglo-Catholic Theology*. In consequence of a sermon on *The Holy Eucharist, a Comfort to the Penitent*, preached before the university in 1843, he was suspended from preaching by the vice-chancellor for three years, on the allegation that his language on the subject of the real presence was beyond what is sanctioned by the formularies of the church of England. Dr. Pusey, however, protested against the proceeding, and appealed to the teaching of English divines. His other principal works are—*Remarks on the Benefits of Cathedral Institutions;* two treatises on the *Royal Supremacy in Spiritual Matters;* a treatise on the *Ancient Doctrine of the Real Presence; Letters to the Archbishop of Canterbury, the* (late) *Bishop of Oxford, and the* (late) *Bishop of London, in Defense of Church Principles; On Marriage with a Deceased Wife's Sister; On the Use of Private Confession in the English Church;* translations of several foreign devotional works adapted to the use of the English church; *History of the Councils of the Church;* a *Commentary on the Minor Prophets; Lectures on the Prophet Daniel;* a *Catalogue of Arabic MSS. in the Bodleian Library;* and numerous sermons.

PUSHKIN, ALEXANDER SERGEIVITCH, a Russian poet of good family, was born at Moscow, May 26, 1799, and educated at the imperial lyceum of Tsarskoe Selo, where he acquired more reputation for his liberal opinions than for his attention to study. In 1817 he entered the service of government, and soon became one of the most prominent figures in fashionable society. In 1820 he published his romantic poem of *Ruslan and Liudmila*, which met with a flattering reception from the public. The incidents are laid in the legendary times of Vladimir, the Russian Charlemagne. During the next five years Pushkin led a roving sort of life, in the course of which appeared his *Plennik Kavkaskoi* (Prisoner of the Caucasus, 1822), which narrates the escape of a young Russian from a Circassian horde by the help of a Circassian maid; and his *Fountain of Bakhtchiserai* (1824), a poem of singular beauty and interest. These were followed by *Tzigani* (The Gipsies, 1827), a picture of wild gipsy life in Bessarabia, and *Evgenii Onaegin* (1828), a humorously sarcastic description of Russian society—after the fashion of Byron's *Beppo*. In 1829 he published his last narrative poem, *Pultava*, which has for its hero Mazeppa, the famous Hetman of the Cossacks. About the same time, he wrote a dramatic poem entitled *Boris Godunov*, one of the best of all his works; but subsequent to this he appears to have addicted himself almost wholly to prose. Another, and less commendable change, however, took place in him. From being or seeming an enthusiastic "liberal," he passed—after his appointment to the office of imperial historiographer, with a pension of 6,000 rubles—to the extreme of Russian conservatism. The chief thing he did in his official capacity was to write the life of the rebel Pugatschew. He was mortally wounded in a duel, and expired at St. Petersburg, Jan. 29 (Feb. 10), 1837. Pushkin is reckoned the finest poet that Russia has produced in the present century. His countrymen call him the "Russian Byron," and he has not a little of the bold and brilliant genius of his prototype, excelling like him in vigor of imagery and impassioned sentiment.

PUSTULAR DISEASES. Under this head are included the cutaneous diseases which are characterized by *pustules*, or circumscribed elevations of the cuticle, containing pus; they are ecthyma, impetigo, acne, and sycosis, all of which are noticed in special articles. Pustules also occur in small-pox, and occasionally in chicken-pox, but these are on good grounds regarded as febrile diseases, in which the eruption on the skin is not the primary disorder. Boils (q.v.), although not included under the head of "pustular diseases," are in their nature pustular.

PUSTULE, MALIGNANT. See MALIGNANT PUSTULE, *ante*.

PUTCHUK, an aromatic root, a considerable article of commerce in India, where it is used both as a perfume and as a medicine, and of export to China, where it is much used for incense, as it gives out a very pleasant odor when burned. It appears to be the *costus* (q.v.) of the ancients, and is the root of *Aucklandia costus*, one of the *compositæ*, and not, as was once supposed, of a species of *costus*, one of the *scitamineæ*. It grows in Cashmere, and is called *kooth* in Northern India. Putchuk is its name at Calcutta.

PUTEAUX, a t. of France, in the dep. of Seine, at a distance of about two m. from the western boundary of Paris. It is situated on the left bank of the Seine, opposite to the Bois de Boulogne. The situation of Puteaux is a very pleasant one, and many Parisians have fine villas here. The population and industrial activity of the place have of late greatly increased. Pop. '76, 11,387.

PUTEOLI. See POZZUOLI, *ante*.

PUTIGLANO, a t. in the province of Bari di Puglia, Italy; pop. about 10,000. Besides agriculture, the chief industry is the manufacture of cotton and woolen cloths, and nails.

PUT-IN-BAY ISLANDS, at the w. end of lake Erie, is a group of ten islands, viz., Put-in-Bay, formerly known as South Bass and Bass isle, Middle Bass *alias* Floral isle, North Bass *alias* isle of St. George, Rattlesnake, Sugar, Green *alias* Strontian, Glacial *alias* Starve island, Ballast, Buckeye, and Gibraltar. The group constitutes Put-in-Bay township of Ottawa county, Ohio. Put-in-Bay island proper is the largest of the group, and contains about 2,000 acres. The surface rises from 10 to 80 ft. above the lake, and, like all the islands in the w. end of lake Erie, has but a thin deposit of soil overlying limestone rock, which forms their low but picturesque shores. A beautiful bay on the n. of the island gives its name and fame to the island; for here the gallant young Oliver Perry, commander of the little fleet of the United States on lake Erie in the last war with Great Britain, was waiting for the British fleet in Sept., 1813, and on the 10th sallied out to give it battle. The engagement was brilliant. After the young commander's own ship had been quickly and totally disabled by the enemy, he crossed in an open boat to another, and within two hours after the battle began the British fleet surrendered, and Perry wrote that laconic dispatch to Gen. Harrison, "We have met the enemy and they are ours." (See PERRY, OLIVER HAZARD.) After the battle the remnant of the fleets returned to Put-in-Bay. Gibraltar is a small and picturesque rocky island lying at the mouth of the bay. Here the Perry monument has been built to commemorate the victory and its heroes; and Jay Cooke, who owns the island, has a picturesque summer residence. On the main island a park was reserved on the inner shore of the bay, and large summer hotels were erected between 1850 and 1860. Until the destruction of the largest by fire in 1878 it was a favorite resort for summer travelers, especially from the south. The clear and shallow water of the bay and the lake, the loveliness of the scenery among the verdant islands, the facilities for all kinds of boating, excellent fishing, convenient bathing beaches, and easy connections by steamers with the cities of the lakes, combine to make this group attractive among watering-places. Grape-growing and wine-making are the principal industries. The climate and soil of these islands, it is now conceded, make their vineyard products superior to any other in the United States on the Atlantic slope. The Catawba is the principal variety of grape cultivated, but there are considerable vineyards of Delaware, Concord, Norton's Virginia, and Ive's seedling. A cave of considerable dimensions is one of the curiosities of the island.

Middle Bass island is the second in size of the group, about two m. n.w. from the former. On its w. end a company of citizens of Toledo have secured a grove of the virgin forest and erected a large number of small summer cottages, a central eating hall, and a dock, forming the prettiest residence group of the islands. Near it are extensive vineyards, and a large music and pleasure hall. On the s. side of the island facing Put-in-bay are the extensive wine-vaults of Werle Werke & Co. of Cincinnati, and over them a large promenade and refreshment hall, built to meet the wants of summer travelers. This wine-house sells yearly 500,000 gallons of island wines. A steamer plies every half hour between the hotels of Put-in-Bay and this pleasure house.

Rattlesnake, Sugar, Green, and Starve islands are small and unimportant outliers of the islands just described. Glacial island is named from the unusually well-marked lines of glacial action that are found upon it, but which are found in places on all the islands. Ballast island is the site of the "Cleveland colony"—the summer cottages of a company of Cleveland people.

North Bass, *alias* isle of St. George, is the most westerly of the group. It contains about 1000 acres, and rises by smooth slopes from the lake to an elevation of 80 feet. On its w. end is one of the best light-houses on the lake. Excellent vineyards cover most of its surface.

PUTLOGS, small timbers used in the construction of buildings. They lie between the wall and the poles of the scaffolding, and on them the floor of the scaffolding rests. Apertures called "putlog-holes" are common in buildings of all ages.

PUTNAM, a co. in n.e. Florida, drained by the St. Johns river, which bounds it on the e.; 630 sq.m.; pop. '80, 5,746—5,270 of American birth, 2,219 colored. The surface is level and sandy, mostly covered by pine forests. There are many small lakes and swamps. Cotton, sugar-cane, grass, and cattle are the staples. Co. seat, Palatka.

PUTNAM, a co. in n. central Georgia, bounded on the e. by the Oconee river, drained by Little river, traversed by a branch of the Central railroad of Georgia; about 400 sq.m.; pop. '80, 14,539—14,512 of American birth, 11,027 colored. The surface is rolling or hilly and heavily wooded. The soil is fairly fertile. The principal productions are corn, cotton, and wheat. Co. seat, Eatonton.

PUTNAM, a co. in n. central Illinois, drained by the Illinois river; traversed by the Peoria branch of the Chicago, Rock Island and Pacific railroad; about 150 sq.m.; pop. '80, 5,555—4,702 of American birth. The surface is mostly level. Deposits of coal are found. The soil is fertile. The principal productions are corn, oats, wheat, barley, rye, and potatoes. Co. seat, Hennepin.

PUTNAM, a co. in w. central Indiana, drained by Eel river and its branches; traversed by the Indianapolis and St. Louis and other railroads; about 500 sq.m.; pop. '80, 22,502—21,916 of American birth, 570 colored. The surface is uneven, but the soil fertile; the products are corn, wheat, oats, hay, pork, and wool. Lumber and carriages are made. Limestone is found. Co. seat, Greencastle.

PUTNAM, a co. in n. Missouri, bordering on Iowa, drained by Locust creek and Chariton river, its e. boundary; traversed by the Burlington and Southwestern railroad; 500 sq.m.; pop. '80, 13,556—13,333 of American birth. Corn, tobacco, pork, wool, coal, and lumber are the staples. Co. seat, Unionville.

PUTNAM, a co. in s.e. New York, adjoining Connecticut; bounded on the w. by the Hudson river; drained also by Croton river and Peekskill creek; intersected by the Hudson River and New York and the Harlem railroads; about 220 sq.m.; pop. '80, 15,181—12,948 of American birth. The surface is hilly, and the scenery picturesque, including the highlands of the Hudson and lake Mahopac, a summer resort. Marble and iron are found. The soil is fertile, the principal productions are corn, oats, and hay. Co. seat, Carmel.

PUTNAM, a co. in n.w. Ohio, drained by the Ottawa, Blanchard, and Auglaize rivers, and intersected by the Dayton and Michigan railroad and the Miami canal; 500 sq.m.; pop. '80, 23,718—21,669 of American birth. The surface is nearly level, and heavily wooded. Corn, wool, grass, pork, and lumber are the chief products. Co. seat, Ottawa.

PUTNAM, a co. in central Tennessee on the n.w. slope of the Cumberland range; drained by branches of the Cumberland river; 480 sq.m.; pop. '80, 13,556—13,333 of American birth, 20 colored. The surface is hilly, and the soil only moderately fertile; tobacco, corn, wool, and pork are the staples. Coal is found. Co. seat, Cookville.

PUTNAM, a co. in n. West Virginia, drained by the Great Kanawha river, intersected by the Chesapeake and Ohio railroad; about 377 sq.m.; pop. '80, 11,376—11,189 of American birth, 356 colored. The surface is hilly and heavily timbered. The soil is fertile. The principal productions are corn, wheat, oats, and hay. Coal and iron are found. Co. seat, Winfield.

PUTNAM, a t. in Windham co., Conn., on the Quinnebaug river, the Norwich and Worcester and the New York and New England railroads; pop. '70, 4,192. It has churches, schools, newspapers, and banks. There are large cotton and woolen mills, etc.

PUTNAM, Frederick Ward, b. Mass., 1839; educated at the Lawrence scientific school. He was superintendent of the museum of the Essex institute, editor of the *Naturalist Directory*, director of the Peabody academy of science at Salem, 1867–75, when he was appointed curator of the Peabody museum of archæology and ethnology connected with Harvard university. He edited the *American Naturalist*, 1867–75. In 1875 he was assistant in archæology on the U. S. surveys w. of the 100th meridian.

PUTNAM, George Palmer, 1814–72; b. Maine; great-nephew of gen. Israel Putnam; settled in New York at an early age, where he established himself as a bookseller, being also long associated with John Wiley in the firm of Wiley & Putnam. He was one of the earliest publishers to recognize the growing value of American works; and besides issuing the works of Washington Irving, J. Fenimore Cooper, Bayard Taylor, and other prominent authors, was instrumental in introducing many young writers who have since become eminent. In 1853 he founded *Putnam's Monthly*, a periodical formed on a plan more elevated than was then common in American magazine literature, and of which George William Curtis was the editor. It was not financially successful, and was dropped in 1857, though revived for two years, 1868–70. Mr. Putnam also published the official illustrated catalogue of the New York crystal palace industrial exhibition of 1853. He was a laborious compiler of statistical works, including *Chronology*, 1833; *American Facts*, 1845; *The World's Progress, a Dictionary of Dates*, 1850; etc. After his death his business was continued by his sons, under the firm name of George P. Putnam's Sons, who still rank among the leading publishing houses in the United States.

PUTNAM, Israel, 1718–90; b. Mass.; had a limited education, but in his youth was noted for physical strength and courage. In 1739, removing to Pomfret, Conn., he became a farmer and wool-grower. The farmers having long suffered greatly from the depredations of a she-wolf and her whelps, and made fruitless efforts to drive her out of her den by burning brushwood, straw, and sulphur, Putnam entered the cavern by a narrow opening at midnight with a torch in one hand and musket in the other, and shot her as she was on the point of springing upon him. The next 12 years he spent on his farm. In the French war in 1755 he commanded a company of troops at Crown Point; in 1757 received from the legislature the commission of major; saved during this year the powder-magazine of fort Edward at the burning of the barracks; in 1758, his corps being surprised by a party of French and Indians, he was captured, tied to a tree, and for an hour exposed to the fire of friend and foe, but escaped unhurt. The enemy being forced to retire, carried their captive with them, and at night the fire was kindled to burn him alive. He was tied to a tree, and the fire was already blazing, when he was rescued by the interposition of Molang, the French officer. He was taken to Ticonderoga, then to Montreal, where through the influence of col. Peter Schuyler, himself a prisoner, he was exchanged. In 1759 he was promoted to the rank of lieut.col. From that year to 1773 he was engaged either in various expeditions or on his farm. In April, 1775, tidings of the battle of Lexington reaching him while plowing; he left his plow in the field, turned his oxen loose, and mounting his horse rode to Cambridge in one day, a distance of 68 miles. Returning he was made brig.gen. by the legislature, of which he was a member, organized and drilled a regiment, and in a week was on his way back with his men to Cambridge. On his arrival offers of money and a commission as maj.gen. in the royal army were made him by the British officers, which he spurned. In May of that year he led a battalion of 300 men to Noddle's island, burnt a British schooner, captured a sloop, killed and wounded many of the enemy. By his advice it was decided to fortify Bunker hill. At that battle he displayed great energy and bravery. On the arrival of Washington at the camp to take command in July, 1775, he brought commissions from congress for four maj.generals, one of whom was Putnam. On the evacuation of Boston he was placed in command of New York, took part in the battle of Long Island, and on the evacuation of New York was sent to Philadelphia to fortify that city; was afterwards stationed at Crosswick and Princeton; in 1777 was ordered to take command in the Highlands of New York. In the summer of that year he was removed from his command in the Highlands on account of the surprise and loss of forts Montgomery and Clinton, though acquitted of blame by a court of inquiry, and restored to his command. He selected West Point as the site for a fortification. In 1779, when stationed in Connecticut, Horseneck, one of his outposts, guarded by 150 men and 2 cannon, was attacked by Tryon with 1500 men. Putnam, being closely pursued while on his way with his men to a swamp, dashed down a steep hill and escaped, receiving a ball through his hat. Riding to Stamford and collecting the militia, he formed a junction with his troops, pursued Tryon in his retreat, and took 50 prisoners. In the summer of 1779 he had command of the troops in the Highlands, and completed the fortifications at West Point. The army going into winter-quarters he returned home, and on setting out again for camp, was stricken with paralysis. The inscription on his tombstone is, "He dared to lead where any dared to follow."

PUTNAM, Mary (Lowell), b. Boston, 1810; daughter of rev. Charles Lowell; married in 1832 to Samuel R. Putnam, a Boston merchant. She had inherited a remarkable facility for the acquisition of languages, and from 1851 to 1857 resided in France and Germany, where she perfected herself in this direction, and prepared a history of Hungary. She translated Miss Bremer's *The Neighbors*, from the Swedish; and published anonymously *Records of an Obscure Man; Tragedy of Errors;* and *Tragedy of Success;* besides numerous dramatic poems on slavery and other topics of general popular interest. She has been a frequent contributor to the *North American Review* and the *Christian Examiner*.

PUTMAN, Rufus, 1738–1824; b. Mass.; was a millwright; enlisted as a private soldier in 1757 in the French war, and in 1760 was made ensign. The succeeding 10 or 12 years he spent in farming and erecting mills, improving his leisure in study, especially of mathematics and surveying; went in 1773 on an exploring expedition to w. Florida, of which he was made deputy surveyor; in 1775 entered the continental army as lieut. col., and in 1776 was appointed by congress engineer with the rank of col.; in 1778 aided his cousin Israel in completing the fortifications at West Point; in 1783 was made brig. gen.; was a member of the Massachusetts legislature and aid to gov. Lincoln during Shay's rebellion. In 1786 he organized a company composed of the officers and soldiers of the war to form a settlement in Ohio. He was one of three directors appointed by the company to apply to congress for the purchase of lands, and 1,500,000 acres were obtained at 66⅔ cts. per acre. The tract at the junction of the Ohio and Muskingum rivers was selected, and April 7, 1788, Putnam laid out the city of Marietta, the first permanent settlement in Ohio. Sept. 9, 1788, he presided over the first court of general quarter sessions; Mar. 21, 1790, was made judge for the U. S. territory n.w. of the Ohio; in 1792 was appointed brig.gen., and accompanied gen. Wayne's army to Detroit against the Indians, and afterward as the U. S. commissioner made a treaty with several tribes; 1796–83 was surveyor-general of U. S. lands; in May, 1797, was made brig.gen. in the U. S. army; in 1803 was a member of the state constitutional convention.

PUTREFACTION is the term applied to the spontaneous decomposition of organic substances, when such decomposition is accompanied by an offensive odor. In other respects it may be regarded as identical with fermentation (q.v.). In the process of putrefaction, organic compounds of a higher order are resolved into lower organic compounds, into inorganic compounds (such as water, ammonia, sulphureted hydrogen, etc.), or into simple chemical elements) such as hydrogen or nitrogen). The substances which most readily putrefy are the protein bodies (albumen, fibrine, caseine, etc.), and gelatigenous tissues, glue, etc.; the only necessary conditions being the presence of moisture and the access of air at the commencement of the process. Since animals are mainly composed of the protein bodies, they are especially liable to undergo this change; but many vegetable products, which are rich in these bodies (e.g., seeds), are also prone to this form of decomposition. The peculiar smell is readily accounted for when the nature of the resulting compounds is considered.

The putrefaction of organic matters is prevented by a variety of conditions, amongst which may be mentioned (1) exclusion of air, (2) perfect dryness, (3) a freezing temperature (as, e.g., in the case of the mammoths preserved in the Siberian ice), (4) a high temperature (about 250°), and (5) antiputrescent or antiseptic substances of various kinds. It is worthy of notice that all bodies susceptible of putrefactive decomposition may act as ferments, and may thus induce special changes in sugar, urea, etc., which would not have occurred except in the presence of the putrefying matter.

PUTRID FEVER. See Jail Fever.

PUTTING TO SILENCE, in the law of Scotland, is the title of a suit or action of declarator, the object of which is to put an end to certain pretended claims of marriage. The most recent illustration of this action was that in Yelverton *v.* Yelverton. The suit corresponds to what is called in England a suit of jactitation (q.v.).

PUTTU'N, Pattan, or Anhulwar Pattan, a t. in India, in the territory of Guicowar, Guzerat, 64 m. n.w. from Allahabad. It stands on the Saraswati, a small river, which is a tributary of the Banas; and is a town of considerable importance, having manufactures of swords, spears, pottery of a light fine kind, and silk and cotton goods. Puttun occupies part of the site of the ancient city of Anhulwara, the traces of the walls of which may still be seen, extending to about 5 m. in circuit. Pop, estimated at 30,000.

PUTTY, a composition of *whiting* and *drying* oil worked into a thick paste. It is used by painters and glaziers—by the former for filling up holes in surfaces, previous to their being painted with oil-colors; and by the latter, for fixing panes of glass in windows, etc. It becomes remarkably hard in time, and fixes the glass immovably. This has been found rather an evil in some cases, especially where thick plate-glass is used for skylights and other roofing purposes, because it will not permit the expansion and contraction caused by the varying temperature to which the glass is exposed in such situations. Hence the addition, in such cases, has been made lately of a pound of fine Russian tallow to every 12 lbs. of the ordinary putty materials. This prevents its becoming extremely hard, and insures a certain amount of elasticity.

PUTTY-POWDER, a material, consisting of peroxide of tin, in great use for polishing stone and metal work. It is also used as a coloring material for white glass, and for the white enamels of porcelain, etc. It is made by melting tin; as the surface oxidizes, the scum, which is the peroxide, is raked off, and when cold, is reduced to a fine powder, which is white in color, and the particles are extremely hard.

PUY is the name commonly given in the highlands of Auvergne and the Cevennes to the truncated conical peaks of extinct volcanoes. It is perhaps connected with *puit* or *puits*, a "well" or "vent," and may have been given in allusion to the craters of these mountains.

PUY, LE, or LE PUY-EN-VELAY, a t. of France, department of Haute-Loire, about 70 m. s.w. of Lyon, is one of the most picturesque towns in Europe. It stands on the steep southern slopes of mount Anis, from the summit of which starts up precipitously the huge basaltic mass called *Rocher de Corneille*, crowned by the ruins of an ancient episcopal castle. The greatest natural curiosity is the *Rocher de St. Michel*, an obelisk of nature's own making, composed of basaltic tufa, and rising in a solitary abrupt cone from the margin of the river Borne to a height of 265 ft., with a circumference at its base of 500 ft., and at its top, of from 45 to 50 feet. The sides of this "sugar-loaf" are almost perpendicular; but a winding stair cut along the rock conducts to the summit, which is surmounted by a little Romanesque chapel of the 10th century. The most notable buildings of Le Puy are the cathedral, a splendid but heavy-looking structure of the 10th or 11th c., situated in the highest part of the town, and chiefly remarkable for a wonder-working image of the Virgin (*Notre Dame du Puy*). For more than 100 years the town has furnished the carriers and muleteers of southern France with the bells for their horses and mules. Lace is manufactured. Pop. '72, 16,000.

PUY-DE-DOME, a large central department of France, containing an area of 3,070 sq.m., and a population (1872) of 566,463. Plateau and mountain occupy three-fourths of it; plain and valley the rest. Branches of the Cevennes and of the Auvergne mountains overspread the e. and w. of the department. The multitude of conical hills or puys, of basaltic and lava masses, and of craters, shows the volcanic nature of the soil. See AUVERGNE. The principal river is the Allier (a tributary of the Loire), which flows in a northern direction through the middle of the department; but there are numerous lesser streams. The soil is, in general, light and poor; but its volcanic character fosters vegetation; and the splendid valley of Limagne, upward of 70 m. long, is fertile throughout, and well cultivated. The climate is uncertain; the mountains are tormented with howling storms, and more or less covered with snow for six or seven months of the year. The chief products are wheat, rye, flax, fruits (especially cherries and nuts). Some middling wine is also produced. The high pasture-lands support great numbers of cattle, sheep, and goats. The principal minerals are iron, antimony, and lead. Hot and cold mineral springs are abundant; among the most frequented are those of St. Myon and Chateldon. The department is subdivided into the arrondissements of Ambert, Clermont, Issoire, Riom, and Thiers.

PUZZOLA'NA. See POZZOLANA, *ante*.

PUZZUOLI. See POZZUOLI, *ante*.

PYÆ'MIA (from the Gr. *pyon*, pus, and *hæma*, blood), or purulent infection of the blood, is a disease whose exciting cause is the introduction of decomposing animal matter into the circulation. The animal matter may be decomposing pus, unhealthy secretions, putrid fluid (as from decomposing hides, dead bodies, etc.), the fluid of glanders, etc.; and it may be introduced through an ulcer or a wound, through an imperfectly closed vein (see PHLEBITIS and PUERPERAL FEVER), or through a mucous membrane, as that which lines the nostrils. The poison in these cases, if it acts at all, is rapidly absorbed and diffused, and the blood undergoes certain changes, the nature of which chemistry has as yet failed to detect. Within 24 hours, in very acute cases, there are severe shiverings, headache, and giddiness, followed by heat, perspiration, and accelerated circulation. In 24 hours more the patient may be in a hopeless condition, delirious, and rapidly sinking. In less acute cases the symptoms closely resemble those of typhoid fever, and in this form the disease is a common cause of death, after surgical operations. It is only, however, when there are *predisposing causes* that the poison acts so severely. By their presence they convert a comparatively slight local mischief into infection or the whole mass of the blood; while by their absence they render the poisonous matter comparatively harmless. Mr. Callender, whose essay on pyæmia is the most complete that has yet appeared (for the recognition of the disease by a special name is comparatively recent), signalizes as the chief predisposing causes—previous illness; extreme prostration or exhaustion of the system from organic disease, from surgical complaints, or from difficult parturition; unhealthy occupations; over-indulgence in food, etc.

In association with the general symptoms which have been already stated, there are often local or secondary complications.

The disease is always accompanied with great danger. When secondary complications are present, the hope of recovery is very small. "Practical surgeons," observes Mr. Callender, "acknowledge that very little chance remains for the patient who, after an operation, is attacked with symptoms of this disease." The only disease with which this disorder can be confounded is typhoid fever.

If the poison has been received into the system by an open sore, nitrate of silver should be applied freely, after which the part should be treated with soothing fomentations or poultices. The bowels should be freely acted on by a sharp purgative (as 5 grains of calomel and a scruple of jalap). The action of the skin should be increased by diaphoretics, and the bowels should be daily acted on by saline draughts, with the addition of bicarbonate of potash to stimulate the kidneys. By these means the poison may be eliminated. The depression of the nervous system, which is usually very marked, must be counteracted by opium in small and repeated doses, in addition to which, a dose of Dover's powder (10 grains) should be taken at bed-time. Stimulants, such as brandy and sherry, should be given in small but frequently-repeated doses from almost the beginning of the disease, and light nutritious food should be given as freely as the stomach will bear it. The internal administration of hyposulphite of soda and of the hyposulphites generally, has been lately recommended by prof. Polli of Milan,

Considering that pyæmia is the cause of death in 10 per cent of *all* cases of amputation, and in 43 per cent of *all fatal* primary amputations, it becomes a question of great importance how it can be prevented. Persons whose health is already broken down require careful preparation before undergoing an operation. "They must be strengthened," says Mr. Callender, "by tonics, such as quinine and iron; and their secretions must be set right by appropriate alteratives; this treatment must be continued for a considerable period; for if the health be much broken, it is slow of taking effect, and its employment for only a few days prior to an operation is of course simply useless. The diet should at the same time be attended to; and persons of intemperate habits should be accustomed to a more healthy mode of living, although in no case should the stimulants be too suddenly withdrawn." On the same principles, after the operation has been performed, these patients must have their strength supported by a nutritious diet; must have stimulants freely given them, if there are any signs of incipient prostration; and should take opium in sufficient doses to quiet the system and allay irritation.

PYAT, FÉLIX, b. France, 1810; was carefully educated, studied law, and was admitted to the bar as an advocate in 1831. He preferred a literary career, and against the counsel of his friends, became a newspaper writer—at first for the *Figaro* and *Charivari*, and afterward on the regular staff of the *Siècle*. He also wrote plays, some of which gained great popularity through their political references. Among his works of this class were *Mathilde*, *Diogene*, and *Le Chiffonier de Paris*. On the outbreak of the revolution in 1848 he threw himself at once into the struggle on the side of the people: attaching himself peculiarly to the fortunes of Ledru-Rollin, whom he afterward accompanied into exile. In this year he published *Le Droit du Travail*. After the return of the queen of England from her visit to Paris in 1855, he addressed to her *The Letter of the Jersey Exiles to the Queen of England*, which attracted general attention. In 1861 he was tried for a political offense before the correctional police in Paris, and sentenced, *par contumace*, to fine and imprisonment. On the establishment of the republic of 1870 he returned to Paris, where he became a leader of the commune, and edited several revolutionary journals, including the *Combat* and *Vengeur*. In 1873 he was placed under condemnation to death, *par contumace*, on an indictment for inciting to civil war, participation in the insurrection of the commune, and complicity in the massacre of the hostages.

PYCNOGON'IDÆ, a very remarkable family of *crustacea*, of the section *edentata* of Milne-Edwards, and forming the order *araneiformes* (spider-like) of some authors. By Cuvier and many other naturalists, a place was assigned them among *arachnida;* and it is only of late that they have been decidedly referred to *crustacea*, in consequence of the discovery that they undergo metamorphoses. They are all marine, and some of them live among algæ, or are to be found under stones on the beach, whilst others are dredged from deep water. They seem to prey by suction on mollusks, but probably on many kinds of marine animals. The legs of many, as in the genus *pycnogonum*, are furnished with hooks for taking hold, and Linnæus believed *P. littorale* to be parasitic on whales; but it is not uncommon among sea-weeds on the British coasts. The suctorial proboscis of these creatures may be said to form the whole head. The abdomen is almost rudimentary, Their most remarkable characteristic is in their digestive cavity. The stomach gives off from its circumference ten long cæca, four of which on each side extend into the proper or locomotive legs, the other two into the pincer-like rudimentary foot-jaws. These ramifications of the alimentary canal seem to serve all the purposes of the circulatory, respiratory, and chyliferous systems of higher animals. This arrangement, which appears also among the inferior tribes of some other classes of animals, has received from M. de Quatrefages the name of *phlebenterism* (Gr. vein-intestineism). The stomach of the pycnogonidæ with its cæca floats almost freely within the general cavity of the body in a fluid, which is kept in agitation by the movements of the limbs.

PYC'NOSTYLE. See INTERCOLUMNIATION.

PYDNA, a city of ancient Macedonia, on the w. coast of the Thermaic gulf, which was taken by Archelaüs after the Peloponnesian war. After his death it became subject to Athens, but was taken from them by Philip and given to Olynthus. Near it took place the great battle between the Romans, under Paulus Æmilius, and the Macedonian general, Perseus, in which the latter was defeated and the Macedonian empire destroyed.

PYGMA'LION, a legendary king and celebrated statuary of the island of Cyprus, who, disgusted with the dissolute character of the women of his island, resolved never to marry. Enamored of a beautiful ivory statue which he had made, he requested Venus to give it life. Embracing it he perceived that it became sensible by degrees, and at last a living maid, whom he married, and became the father of Paphus, the founder of the city Paphus in Cyprus.

PYG'MIES (Gr. *pygmē*, a measure—from the elbow to the hand), a fabulous race of dwarfs in whose existence the ancients believed. Homer says that every spring they were attacked by the cranes on the coasts of Oceanus. Later writers place them at the mouths of the Nile, but we also read of northern pygmies inhabiting the region of Thule, and of pygmies who lived in subterranean dwellings on the eastern side of the Ganges. Greek fancy worked hard to paint the Liliputian dimensions of these creatures. It was said that they cut down every corn-ear with an axe; that when Hercules came into their country, they climbed up his goblet, by the help of ladders, to drink from it; and that when he was asleep two whole pygmy armies fell upon his right, and another on his left, hand, but were all rolled up by the hero in his lion's skin. Aristotle did not believe that the stories about pygmies were utterly fabulous, however much they had been overlaid by fancy with the marvelous. His "rationalistic" (if not rational) interpretation was, that they were probably some diminutive tribe in upper Egypt, who rode very small horses and lived in caves. A race of very small men was encountered by Schweinfurth in his travels in the heart of Africa (1868–71).

PYGMIES OF WESTERN AFRICA. The existence of pygmy races of human beings in Africa has been often asserted, and many circumstances less easily credible than their diminutive size have been reported. See PYGMIES. Du Chaillu some time ago discovered the actual existence of a pygmy race, but of whom the diminutive size is the only remarkable characteristic. He found them in the mountainous country on the e. of the southern great branch of the Ogobai. They are called Obongos, are about 4½ ft. in height, and live in the midst of negro tribes of ordinary stature. They subsist chiefly on animal food, but partly also on the roots, berries, and nuts which they find in the forests. Schweinfurth, in his travels in the heart of Africa, 1868–71, also came into contact with a nation of pygmies.

PYLUS, or PYLOS, an ancient t. of Messenia in the Peloponnesus, from which Homer's *Nestor* is supposed to have come, though the poet may have referred to the city of the same name in Triphylia. After the second Messenian war the old city was destroyed by the inhabitants; but B.C. 425 the site was fortified by the Athenian forces under Demosthenes the general, and here they gained a noted victory over the Spartans. The present port of Navarino was probably the scene of the naval battle of Sphacteria.

PYM, JOHN, famous as the leader of the popular party in the house of commons in the reign of Charles I., was b. in 1584. He came of a good family in Somersetshire, and had considerable property in that county. He was for some years a gentleman commoner of Pembroke college, Oxford, and afterward studied law at one of the inns of court. Having been sent to parliament as member for Tavistock, in Devonshire, he attached himself to the popular party; and, during the later part of the reign of James I., became noted for his vigorous opposition to the arbitrary measures of the court. In 1626, the year after the accession of Charles I., he distinguished himself by taking a prominent part in the impeachment of the king's favorite, the duke of Buckingham. In 1640, the functions of parliament having been in abeyance for 13 years, during which time the popular discontents had gradually been growing to a head, the celebrated long parliament was convened; and from the first, Pym was by common consent recognized in it as the leader of the opposition to the despotic policy of the monarch. For the position which he thus occupied his qualifications were eminent. In temper, he was bold and fearless; he was master of an eloquence close, terse, and vigorous; and in knowledge of parliamentary form and business procedure, it was considered he had scarcely his equal in the house. On Nov 8, as soon as business had opened, he set forth to the house, in a long and elaborate address, the intolerable grievances under which the nation labored; and a week after, he boldly denounced the earl of Strafford as the "great promoter of tyranny," to whose evil influence on the mind of the king these grievances were in the main to be attributed. In the impeachment of Strafford which followed, resulting in his execution under a bill of attainder passed upon him, Pym took the leading part. Of this master-stroke of policy, which deprived the king of the one man of resolute temper and powerful genius who adhered to his cause, the credit must be chiefly awarded to Pym. In the subsequent proceedings against Laud he was also conspicuous, as in every other crisis of moment, up to the time when war became inevitable between the king and the parliament. On the breaking out of hostilities, he remained at his post in London, and in the exercise of the functions of the executive there, rendered services to the cause not less valuable and essential than those of a general in the field. While the strife was yet pending, he died somewhat suddenly at Derby house, on Dec. 8, 1643, having been appointed to the important post of lieut. of the ordnance only the month previous. He was buried at Westminster abbey with great pomp on the 13th; and was borne to his last resting-place by six members of the house of commons. The house of commons also voted £10,000 in payment of his debts.

PYNAKER, Adam, 1621–73; b. Holland, at the village of Pynaker, whose name he retained. He studied at Rome, and obtained a high reputation as a painter. His landscapes, into which he frequently introduces picturesque buildings and ruins, are much esteemed. He painted over 70 pictures.

PYNCHON, John, 1627–1703; b. England; brought to this country when a child by his father, William Pynchon (q.v.). He succeeded to very large landed estates in the Connecticut valley and about Springfield, and also made large purchases of lands from the Indians, with whom he was on excellent terms. He was for many years magistrate of Springfield, and in 1754 was one of the founders of Northampton; was one of the governor's "assistants," and a member of sir Edward Andross's council of New England.

PYNCHON, William, 1590–1661; b. Essex co., England. In 1630 he came to Massachusetts in company with John Winthrop, the new gov., and became the treasurer of the colony. He was one of the founders of the town of Roxbury, and about 1637 become chief magistrate of Springfield. In 1650 he sent to England and had published a book called *Meritorious Price of Christ's Redemption*, opposing the Calvinistic view of the atonement. For this he was deposed from the magistracy and the book was burned on Boston common. He returned to England and there published *The Jewes Synagogue* (1652), and *How the First Sabbath was Ordained* (1654).

PYNE, Louisa, a popular English singer, daughter of a well-known singer, Mr. G. Pyne, was b. in 1824, received instruction from sir George Smart, and first appeared in public in London in 1842. She appeared in Paris in 1847, made her *début* in opera in 1849, and has since visited America. She is chiefly known from her being chief soprano of an English opera company, in which she was associated with Mr. Harrison at the Lyceum, Drury Lane, and Covent Garden.

PYRACANTHA. See Cratægus.

PYRAMID, in geometry, is a solid figure, of which the base is a plane rectilinear figure, and the sides are triangles, converging to a point at the top or "apex." Pyramids, like prisms, are named from the form of their bases; thus, a pyramid having a triangle for its base is a triangular pyramid; with a square base, a square pyramid; with any four-sided figure for its base, a quadrangular pyramid; or it may be pentagonal, hexagonal, etc. Pyramids may be either "right" or "oblique." See Prism. A right pyramid, with an equilateral figure for its base, has all its sloping edges equal; but this is not the case if the pyramid be oblique. The most remarkable property of the pyramid is, that its volume is exactly one-third of that of a prism having the same base and vertical height; and it follows from this, that all pyramids having the same base and height are equal to each other.

PYRAMID, a structure of the shape of the geometric figure so called, erected in different parts of the old and new world, the most important being the pyramids of Egypt and Mexico. Those of Egypt were considered one of the seven wonders of the world, are 70 in number, of different sizes, are between 29° and 30° n. lat., and are masses of stone or brick, with square bases, and triangular sides. Although various opinions have prevailed as to their use, as that they were erected for astronomical purposes, for resisting the encroachment of the sand of the desert, for granaries, reservoirs, or sepulchers, the last-mentioned hypothesis has been proved to be correct in recent times by the excavations of the late gen. Howard Vyse, who is said to have expended nearly £10,000 in investigating their object and structure. They were all the tombs of monarchs of Egypt who flourished from the fourth to the twelfth dynasty, none having been constructed later than that time; the subsequent kings being buried at Abydos, Thebes, and other places, in tombs of a very different construction. The meaning of the word pyramid is involved in great obscurity; although attempts have been made to derive it from the Coptic *piharam*, yet, as in the hieroglyphs, it is found in connection with the words *ben ben* or *ber ber*, forms of the Coptic *beebe mahou*, or tomb, and *abmer*, or sepulcher, it is probably an ancient Greek word. The pyramids are solid mounds raised over the sepulchral chambers of the kings, the first act of an Egyptian monarch being to prepare his future "eternal abode." For this purpose, a shaft of the size of the intended sarcophagus was first hollowed in the rock at a suitable incline to lower it, and at a convenient depth a rectangular chamber was excavated in the solid rock. Over this chamber a cubical mass of masonry, of square blocks, was then placed, leaving the orifice of the shaft open. Additions continued to be made to this cubical mass both in height and breadth as long as the monarch lived, so that at his death all that remained to be done was to face or smooth the exterior of the step-formed mound. But in some cases the masonry passed beyond the orifice of the shaft, which involved the construction of a new shaft, having its orifice beyond it. The pyramid was faced by adding courses of long blocks on each layer of the steps, and then cutting the whole to a flat or even surface, commencing from the summit. The outer masonry, however, or casing, as it is called, has in most instances been partially stripped off. Provision was made for protecting the vertical joints by placing each stone half way over another. The masonry is admirably finished; and the mechanical means by which such immense masses of stone were raised to their places has long been a mystery; the discovery, however, of large circular holes in some of the stones has led to the conclusion that they were wound up by machines. The stones were quarried on the spot; sometimes, however, granite taken from the quarries of Syene was partially employed. The entrances were carefully filled up, and the passage protected by stone portcullises and other contrivances, to prevent ingress to the sepulchral chamber. There appears to have been also a door or pylon at the entrance of the shaft, ornamented with Egyptian sculptures and hieroglyphs. The sides of the pyramids face the cardinal points, and the entrances face the north. The work of the larger pyramids was executed by corvées of laborers. The most remarkable and finest pyramids are those of Gizeh, situated on a level space of the Libyan chain at Memphis, on the w. bank of the Nile. The three largest are the most famous.

The first or Great Pyramid, as appears from the excavations of Vyse, was the sepulchre of the Cheops of Herodotus, the Chembes, or Chemmis, of Diodorus, and the Suphis of Manetho and Eratosthenes. Its height was 480 ft. 9 in., and its base 764 ft. square; in other words, it was higher than St. Paul's cathedral, on an area the size of Lincoln's Inn Fields. Its slope or angle was 51° 50′. It has been, however, much spoiled and stripped of its exterior blocks for the building of Cairo. The original sepulchral chamber, called the subterranean apartment, 46 ft. × 27 ft., and 11 ft. 6 in. high, has been hewn in the solid rock, and was reached by the original passage of 320 ft. long, which descended to it by an entrance at the foot of the pyramid. The excavations in this direction were subsequently abandoned, on account of the vast size attained by the pyramid, which rendered it impracticable to carry on the entrance on a level with the natural rock, which had been cut down and faced for that purpose. Accordingly, a second chamber, with a triangular roof, was constructed in the masonry of the pyramid, 17 ft. × 18 ft. 9 in., and 20 ft. 3 in. high. This was reached by a passage rising at an inclination of 26° 18′, terminating in a horizontal passage. It is called the queen's chamber, and occupies a position nearly in the center of the pyramid. The monument —probably owing to the long life attained by the monarch—still progressing, a third chamber, called the king's, was finally constructed, by prolonging the ascending passage of the queen's chamber for 150 ft. further into the very center of the pyramid, and after a short horizontal passage, making a room 17 ft. 1 in. × 34 ft. 3 in., and 19 ft. 1 in. high. To diminish, however, the pressure of the superincumbent masonry on the flat roof, 5 small chambers were made vertically in succession above the roof, the last one pointed, varying in height from 1 ft. 4 in. to 8 ft. 7 in., the apex of the top one being rather more than 69 ft. above the roof of the king's chamber. The end of the horizontal passage was finished in a superior style, and cased with red Syenitic granite; and in the king's chamber was the granite sarcophagus of the king Cheops, 7 ft. 6¼ in. long, 3 ft. 3 in. broad, and 3 ft. 5 in. high, for whom the pyramid was built.* As the heat of this chamber was stifling, owing to want of ventilation, two small air-channels, or chimneys about 9 in. square, were made, ascending to the n. and s. sides of the pyramid. They perfectly ventilate this chamber. After the mummy was deposited in the king's chamber, the entrance was closed with granite portcullises, and a well made at the junction of the upward-inclined and horizontal passages, by which the workmen descended into the downward-inclined passage, after carefully closing the access to the sepulchral chambers. The changes which took place in this pyramid gave rise to various traditions, even in the days of Herodotus, Cheops being reported to lie buried in a chamber surrounded by the waters of the Nile. It took a long time for its construction—100,000 men being employed on it for 30 years, or more probably for above half a century, the duration of the reign of Cheops, which is dated by different chronologists at 3,229, 3,095, or 2,123 B.C. The operations in this pyramid by gen. Vyse gave rise to the discovery of marks scrawled in red ocher in a kind of cursive hieroglyphs on the blocks brought from the quarries of Tourah. These contained the name and titles of Khufu (the hieroglyphic form of Cheops); numerals and directions for the position of materials: with them were masonic marks.

The second pyramid is situated on a higher elevation than the first, and was built by Suphis II., or Kephren, who reigned 66 years, according to Manetho, and appears to have attained a great age. It has two sepulchral chambers, and appears to have been broken into by the caliph Alaziz Othman Ben-Yousouf, 1196 A.D. Subsequently it was opened by Belzoni. The masonry is inferior to the first, but it was anciently cased below with red granite.

The third pyramid, built by Menkara, or Mycerinus, who reigned 63 years, is much smaller than the other two, being only 218 ft. high and 354 ft. 6 in. square. It has also two sepulchral chambers, both in the solid rock. The lower sepulchral chamber, which held a sarcophagus of rectangular shape, of whinstone, had a pointed roof, cut like an arch inside; but the cedar coffin, in shape of a mummy, had been removed to the upper or large apartment, and its contents there rifled. Among the débris of the coffin and in the chambers were found the legs and part of the trunk of a body with linen wrapper, supposed by some to be that of the monarch, but by others to be that of an Arab, on account of the anchylosed right knee. This body and fragments of the coffin were removed to the British museum; but the stone sarcophagus was unfortunately lost off Carthagena, by the sinking of the vessel in which it was being transported to England. The masonry of this pyramid is most excellent, and it was anciently cased half-way up with black granite.

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* The opinion that this granite, or porphyry coffer, was a sarcophagus, has been questioned, and the theory has been advanced that it was a standard measure of capacity, of which the British quarter is the fourth part.—See J. Taylor's *The Great Pyramid: Why was it Built?* (1859), and Piazzi Smyth's *Our Inheritance in the Great Pyramid* (1864).

There are six other pyramids of inferior size and interest at Gizeh; one at Abou Rouash, 5 m. to the n.w. of the same spot, is ruined, but of large dimensions; another at Zowyet El Arrian, also made of limestone, is still more ruined; another at Reegah, a spot in the vicinity of Abooseer, also much ruined, and built for the monarch User-en-Ra, by some supposed to be Busiris. There are five of these monuments at Abooseer, one with a name supposed to be that of a monarch of the third dynasty; and another with that of the king Sahura. A group of 11 pyramids remains at Sakkara, one with a doorway inlaid with porcelain tiles, and having a royal name. Five other pyramids are at Dashour, the northernmost of which, built of brick, is supposed to be that of the king Asychis of Herodotus, and has a name of a king apparently about the twelfth dynasty. Others are at Meydoon and Illahoon; and two at Biahmo, at Medinat El Fyoum, apparently the sepulchers of the last kings of the twelfth dynasty. Some small brick pyramids of the kings of the eleventh dynasty are at the Drah Aboo Negger at Thebes. In Nubia, the ancient Æthiopia, are several pyramids, the tombs of the monarchs of Meroë, and of some of the Ethiopian conquerors of Egypt. They are taller in proportion to their base than the Egyptian pyramids, and generally have a sepulchral hall, or propylon, with sculptures, which faces the east. The principal groups of these pyramids are at Bege Rauie, or Begromi, 17° n. lat., in one of which gold rings and other objects of late art, resembling that of the Ptolemaic period, were found.

In Assyria the Birs Nimrud, or tower of Belus, was a kind of step-shaped pyramid of seven different-colored bricks, dedicated to the planets by Nebuchadnezzer. The Mujellibe, another mound, was of pyramidal shape. The pyramid also entered into the architecture of the tomb of Sardanapalus at Tanus, and of the mausoleum of Artemisia at Halicarnassus. A small pyramid, the sepulcher of C. Cestius, imitated from the Egyptian in the days of Augustus, still exists within the wall of Aurelian at Rome. Temples and other monuments of pyramidal shape are found in India, China, Java, the Polynesian islands, and elsewhere. The Toltecs and Aztecs erected temples in Mexico, called *teocalli*, or abodes of gods, of pyramidal shape, with steps or terraces by which to ascend and reach an altar, generally placed on the summit, where they performed human sacrifices and other rites. These, however, are not true pyramids, the pure and simple form of which is restricted to Egypt. The pyramid entered extensively into the architecture of the Egyptians, and appears on the tops of obelisks and tombs as a kind of roof. Small models of pyramids, with inscribed adorations to the sun, or having royal names, were also placed in the tombs.—Lepsius, *Ueber den Bau der Pyramiden*, 1843; *Briefe*, pp. 143, 217; Wilkinson, *Topogr. of Thebes* (Lond. 1835); Vyse, *Operations carried on at Gizeh in* 1837 (8vo. Lond., 1840–42); Gliddon, *Otia Ægyptiaca* (Lond. 1849).

PYRAMID LAKE, in Koop co., Nevada, at an elevation of 4,000 feet. It is about 30 m. long and 10 wide, and has no outlet.

PYRAMUS AND **THIS'BĒ.** The tragical history of these two lovers is told by Ovid in the fourth book of his *Metamorphoses*. They were natives of Babylon, and tenderly attached to each other, but their parents would not hear of their marriage; they had to content themselves with clandestine interviews by night. On one occasion they arranged to meet at the tomb of Ninus, where Thisbé, who was first at the trysting-spot, was startled to discover a lioness. She immediately ran off, but in her terror and haste dropped her garment, which the fierce animal, that had just torn an ox in pieces, covered with blood. Soon after Pyramus appeared, and seeing his mistress's robe, came to the conclusion that she had been murdered, whereupon he killed himself. Thisbe now returned, and beholding her lover lying dead on the ground, put an end to her own life. The story was a favorite one during the middle ages, when a couple, unhappy in their love, were termed a *Pyramus and Thisbé*. Shakespeare, in his *Midsummer Night's Dream*, has introduced it—but in a way that has the effect of caricature.

PYRENEES, the name of that mountain-range which, separating France from Spain, extends 270 m. in length, and from 30 to 70 m. in breadth, from the gulf of Rosas, in the Mediterranean, to the s.e. corner of the bay of Biscay. This mountain-system, covering an area estimated at 12,600 sq.m., consists of two great chains, one of which runs e. from the Bidassoa to the w. bank of the Noguera Pallaresa; and the other, originating in the Pic du Midi d'Ossau (9,510 ft.), lat. about 0° 25′ w., a little to the n. of the former, extends eastward, and, after being intersected at the Val d'Aran by the Garonne and many smaller streams, reaches the Mediterranean, on the shores of which, immediately

n. of the gulf of Rosas, it terminates in the promontories of Norfeo and Creuz. The *northern* slopes of these mountains to the plains and undulating districts of the s.w. of France, are of gradual descent; while the southern slopes descend to the mountainous regions of northern Spain by steep terraces. That portion of this mountain-system in which the eastern part of the southern. and the western part of the northern chains run parallel to each other, is called the high or middle Pyrenees—a district about 16 m. in length, and forming the wildest and most elevated portion of the whole system. In the s.w. of the middle Pyrenees is a series of lofty summits, beginning with the Pic du Midi de Pau (9,544 ft.), and ending with the barren Maladetta, whose highest point, the Pic de Nethou or Malahite (11,168 ft.), is the highest summit in the system. Between these two summits, there are several upward of 10,000 ft. high, as mont Perdu (10,994 feet). The north-eastern and less elevated portion of the middle Pyrenees forms a rampart, frequently interrupted by transverse valleys, and of which the principal summits are the Pic de Gavisos (8,170 ft.) and the Pic du Midi de Barèges (9,307 feet). The eastern Pyrenees rise in their highest summits into the region of perpetual snow, and as far as the sources of the Segre, form a mighty unbroken wall of rock. From this point, however, they assume a different character, decreasing in height, and being intersected by valleys. The west Pyrenees nowhere reach the snow-line, as their highest summit, the Pic d'Anie, does not rise above 7,500 feet. Forming at first ridges of from 6,000 to 7,000 ft., they decrease in height as they extend w., until, on the lower Bidassoa, they take the form of isolated masses about 3,000 ft. high. The average height of the Pyrenees is from 6,000 to 7,210 feet. At an almost equal elevation are most of the mountain-passes. These passes, called in some places *cols*, in others *ports* (Span. *puerto*), are about 100 in number, though only seven of them are practicable for wagons and cannon. The most important are the roads of St. Jean de Luz over the Bidassoa to Vittoria, St. Jean Pied du Port to Pampluna, and that from Perpignan over Junquera to Gerona. The Pyrenees comprise no extensive and long valleys. Generally, the valleys are small and caldron-shaped, and communicate by means of narrow passes. The rivers are inconsiderable. The region of perpetual snow, which, on the northern slopes of the mountains, begins at the height of 8,137 ft., and on the southern slopes at 8,858 ft., comprises no extensive snow or ice tracts. Glaciers are few and small, and nowhere occur lower than 7,800 feet. On the warm and dry southern slopes, no glaciers occur. Few forests exist, and the steep walls of rock, parched by the sun and mid-day winds, are either quite bare, or are covered with low brush-wood and meager pasture. The more gradually declining northern slopes, on which snow and springs are more abundant, show a richer vegetation, and are for the most part covered with lofty forests, and beautiful mountain pasture. Granite forms the kernel of the Pyrenean mountain-system, and is overlaid by chalk and sandstone masses. The Pyrenees are not rich in metals, but abound in mineral springs, of which the chief are those of Bagnères de Bigorre (q.v.), and Barèges.

PYRÉNÉES, Basses, a department forming the s.w. corner of France. Area, 2,940 sq.m.; pop. '76, 431,525. The department is divided into five arrondissements of Pau, Oloron, Orthez, Bayonne, and Mauléon. Chief town, Pau. The Aasses-Pyrénées occupies the northern slopes of the western Pyrenees, offshoots from which divide the department into a number of valleys, each traversed by a clear mountain stream, locally known as a *gave*. The chief of these are the gave d'Oloron, gave de Pau, the Didouze, and Nivelle. The high valleys and slopes are generally fertile, and well adapted for the growth of the vine, chestnut, various other fruits, and maize, though not for wheat. The best wines are those of Jurançon and Gau, Pontac and Auberlin. Flax and hemp, rye, barley, oats, and millet are also grown; but the principal source of industry, after the making of wine, is the rearing of horses, cattle, sheep, and mules for the Spanish markets, and the raising of swine in the great beech-forests, together with the preparation of hams of excellent quality and high flavor. Marble, alabaster, slate, ophite, copper, iron, sulphur, and cobalt constitute the chief mineral products; but their importance as sources of wealth falls short of that of the numerous mineral springs, the most important of which are those of Biarritz, Cambo, Eaux-Bonnes, and Eaux-Chaudes.

PYRÉNÉES, Hautes, a department of France, lying e. of the Basses-Pyrénées, is a part of the old province of Gascony. The Hautes-Pyrénées, which, as its name implies, contains the loftiest summits of the Pyrenean chain, is divided into the three arrondissements of Tarbes, Argelès, and Bagnères, and the chief town is Tarbes. The aspect of the scenery is, moreover, very varied—savage mountains and precipitous rocks in the s., an agreeable diversification of hill with dale in the center, softening down to fertile plains in the north. The principal rivers, none of which, however, are navigable in the department, are the Adour, and the gave de Pau. The climate is generally mild in the plains and sheltered valleys, but even there, storms are of frequent occurrence. The well-cultivated and artificially watered low-lands yield good crops of cereals, leguminous plants, flax, fruits of every kind, including the grape, from which excellent wine and brandy are made. Horses, mules, cattle, sheep, swine, and poultry are much reared. This department, which is the richest part of the Pyrenees in mineral products, especially marble of various kinds, copper, iron, zinc, lead, antimony, slate, granite, etc., contains also the most celebrated springs, as the sulphur springs at St. Sauveur, and the hot baths of Bagnères, Barèges, and Cauterets. The very limited commercial industry of Hautes-Pyrénées embraces the manufacture of woolen and mixed fabrics, including bareges, coloring matters, leather, paper, cutlery, etc. There is also a smuggling trade with Spain. Area, 1742 sq.m.; pop. '76, 238,037.

PYRÉNÉES-ORIENTALES, a maritime department of France, is bounded on the e. by the Mediterranean, and on the s. by the Pyrenees. Area, 1590 sq.m.; pop. '76, 197,940. It is divided into the three arrondissements of Perpignan, Prades, and Céret. The chief town is Perpignan. Like the two previously described, this department presents a series of parallel valleys formed by spurs from the Pyrenees, but in this case the valleys run e. and west. They are three in number, and are watered by the Gly, Tet (the principal river), and Techs. The s.w. corner is drained by the Segre (Segura), a tributary of the Ebro. An extended plain occupies all the n. and e. of the department. The climate is good, and in the plains is seldom disturbed by great extremes of heat or cold. The vegetable products include fine grain and some of the choicest fruits of this latitude. Wines constitute the wealth of the district, and include the red wines of Roussillon, the white muscatel of Rivesaltes, and other approved kinds. The chief exports are wine, cocoons, the surplus live stock and its products, sardines, anchovies, etc. The mineral wealth of the district is not remarkable.

PYRHELIOM'ETER, an instrument invented by M. Pouillet, for the purpose of measuring the sun's heat. It consists of a silver plate, coated on the outer surface with lamp-black and containing water or mercury. A thermometer is attached, and by taking into consideration the area of the exposed surface, the quantity of water or mercury, and the degree of heat to which it is raised, the effect of the sun's heat under given conditions is ascertained.

PYRI'TES, a name employed by mineralogists to designate a large group or *family* of minerals, compounds of metals with sulphur, or with arsenic, or with both. They are crystalline, hard, generally brittle, and generally yellow. The name pyrites originally belonged to the sulphuret of iron, known as IRON PYRITES; and was given to it in consequence of its striking fire with steel (Gr. *pyr*, fire), so that it was used for kindling powder in the pans of muskets before gun-flints were introduced. Iron pyrites is commonly of a bright brass yellow color; it is often found crystallized in cubes in which form small crystals of it are abundantly disseminated in some roofing-slates; and very large ones occur in some of the mines of Cornwall; it is also found crystallized in dodecahedrons and other forms, more rarely in oblique four-sided prisms; and it often occurs massive, globular, stalactitic, capillary, or investing other minerals as an incrustation. Beautiful specimens of globular iron pyrites are found in the chalk of England. It is a very widely diffused and plentiful mineral, and seems to belong almost equally to all geological formations. It is too abundant in many coal-fields, the action of water and air changing it into sulphate of iron (vitriol), during which change so much heat is evolved that the coal is frequently kindled by it, mines become unworkable, and the progress of the fire can only be stopped, if at all, by building up portions of them to cut off the access of air, or by the admission of a plentiful supply of water. At Quarreltown, in Renfrewshire, a deep hollow may still be seen, where, about a century ago, the ground fell in, in consequence of a subterranean fire thus kindled. The color of iron pyrites has often caused it to be mistaken for gold, a mistake which its hardness and comparative lightness should prevent, or its ready solubility in nitric acid, and its burning before the blowpipe on charcoal with bluish flame and smell of sulphur. But it sometimes does contain a small proportion of gold, sometimes even in visible grains. This auriferous iron pyrites is found in Siberia and in South America. Iron pyrites is never used as an ore of iron, but it is much used for the manufacture of sulphuric acid, and sulphur is obtained from it by sublimation. It is also used for the manufacture of alum. A variety of iron pyrites of a very pale color is called *marcasite*. There is also a magnetic variety. COPPER PYRITES, also called *yellow copper* and *chalcopyrite*, is the most abundant of all the ores of copper, and yields a large proportion (perhaps a third) of the copper used in the world. It is brass-yellow, the color varying with the amount of copper which it contains, a rich color indicating much copper, and a pale color the presence of a comparatively large amount of iron; for this ore is not a sulphuret of copper, but of copper and iron. It occurs massive and disseminated in rocks of almost every class; and is often found crystallized in octahedrons and tetrahedrons, but generally in very small crystals. It may at once be distinguished from iron pyrites by its comparative softness, yielding readily to the knife, and by the green color of its solution in nitric acid. Before the blowpipe, with borax and soda, it yields a bead of copper. COBALT PYRITES, or *cobaltine*, a sulphuret and arseniuret of copper, is a principal ore of cobalt. It is generally of a silver-white color, and occurs massive, disseminated, or crystallized in cubes, octahedrons, dodecahedrons, and polyhedrons, in primitive rocks. NICKEL PYRITES, also called *copper-nickel* and *nickeline*, used as an ore of nickel, is a compound of nickel and arsenic. It is generally found massive, and is of a copper-red color.

PY'RITZ, a very ancient t. of Prussian Pomerania, in the government of Stettin, 25 m. s.e. of the town of Stettin. There are standing five high towers on the town-walls, built by the Wends, under whom it was a place of great strength. There is a seminary named after Otto, bishop of Bamberg, near the spring where it is said he, in 1124, baptized the first Pomeranian converts. Pyritz has manufactures of woolen cloth and leather. Pop. '75, 7,443.

PYRMONT. See Waldeck-Pyrmont.

PY'ROLA and PYROLA'CEÆ. See Winter Green.

PYROLIG'NEOUS ACID, or Wood Vinegar, a crude commercial from of acetic acid (q.v.). It is made by the destructive distillation of wood, and contains, besides acetic acid, tar and other products, which have to be removed if it is required in a very pure state. Generally, it is obtained in Britain from oak branches, which, after being stripped of their bark, are too small for timber purposes. These are cut into short billets, which are placed in cast-iron retorts, and a sufficient heat applied to drive off the volatile constituents and carbonize the wood. The best woods for the distiller are "hard" woods, although all will yield it. This will be seen from the following table, which partly summarizes the experiments of Stolze:

	100 Parts of Dried Wood give	
	Crude Pyroligneous Acid.	Pure Hydrated Acetic Acid.
Birch (*Betula alba*)	45.0	4.47
Beech (*Fagus sylvatica*)	44.0	4.29
Oak (*Quercus robur*)	43.0	3.88
Ash (*Fraxinus excelsior*)	46.8	3.72
White Poplar (*Populus alba*)	45.8	3.23
Bird Cherry (*Prunus padus*)	47.3	2.93
Juniper (*Juniperus communis*)	45.8	2.34
Spruce fir (*Pinus abies*)	41.2	2.16
Scotch fir (*Pinus sylvestris*)	42.4	2.14

Quick distillation is always found to be much more productive than slow, and the acid is also freer from impurities; for the slower the process, the thicker and darker is the tarry matter. Hence two separate plans have been invented, one by Mr. Halliday, and the other by Mr. W. H. Bowers, both of Manchester, in which sawdust, chips, shavings, and spent dye-woods are used. In Mr. Halliday's plan, the retort is a long tube, with the fire acting along its entire length; inside is an Archimedean screw, worked by machinery, which passes the sawdust or other material slowly from the commencement to the end, where, by particular contrivance, it falls out in the state of thoroughly carbonized wood. It is supplied by means of a hopper. The volatile matters pass up an outlet-pipe in the upper part of the tubular retort. In Mr. Bowers's plan, the principle is similar, though differently carried out. The sawdust is fed through a hopper which is always kept well supplied, so that, by the pressure of the supply, the escape of vapor may be prevented. An endless chain is worked over four rollers by a small steam-engine, and carries the materials from the hopper by means of projections on the chain along the lower side of the retort, so as to bring them in contact with the furnace. By the time the material reaches the bottom, all the volatile matters have been vaporized, and have passed up into the condenser and the carbonized material falls into a cistern of water into which the open end of the retort dips, the water closing it sufficiently. One of these retorts will yield about 200 gallons per day of pyroligneous acid. This acid is of great use in the arts, especially in making the acetates used by dyers and calico printers; and it is also, when very carefully purified and properly diluted with water, used extensively as a substitute for common vinegar in pickling, and even for table use.

PY'ROMANCY. See Divination.

PYROMA'NIA is an involuntary, motiveless tendency to destroy by means of fire. The blind instinct to burn is often manifested in children before reason or a knowledge of property can actuate them, and with no other object than mischievous destructiveness, or to enjoy the blaze of a conflagration. In a large number of the cases, where legal investigation has disclosed the mental condition of the incendiary, and where the motive could not be determined, or was obscure or inadequate, the perpetrators were youthful, of the female sex, and about the period of puberty. It is to be observed that the most remarkable example in modern times of this morbid tendency appearing epidemically, was presented in Normandy in 1830, where barns, granges, and vineyards over a large tract of country were consumed, and where the actors were exclusively girls. When apprehended in numbers they confessed that, though prompted by *internal sensations*, they had no other explicable purpose than to see the light. But this is the pure and typical form of the propensity. In general, insane incendiarism is the result of, or is complicated with, a very obvious incentive. Jonathan Martin, being insane, but impelled by superstition, set fire to York Minster (1829); and passions and delusions of every character, personal and political antipathies, and the spirit of agrarian outrage, may seek gratification in this kind of desolation. Like other outbursts of frenzy, it has been observed to accompany famines, pestilences, and great social convulsions.—Feuchtersleben, p. 293; Marc, *De la Folie*, t. ii. p. 305.

PYROM'ETER (Gr. *pyr*, fire, and *mĕtron*, a measure) is a term originally applied by Muschenbroek in 1731, to an instrument which he invented for measuring the changes produced in the dimensions of solid bodies by the application of heat. It is, however, now applied to any instrument the object of which is to measure all gradations of temperature above those that can be indicated by the mercurial thermometer (q.v.). Desaguliers gives a description of Muschenbroek's instrument, as improved by himself, in his *Experimental Philosophy*. Numerous pyrometers have since been invented, among which may be noticed those of Ellicott (described in *The Philosophical Transactions* for 1736 and 1751), Graham (in do. for 1754), Wedgwood (in do. for 1782, 1784, and 1786), and Guyton (in the *Annales de Chimie*, tome 46). None of these instruments, however, gave accurate results for very high temperatures; and it was not till the year 1821 that prof. Daniell announced the invention of his pyrometer, which has supplanted all others, and for which, in an approved form, he received the Rumford medal from the royal society. It consists of two distinct parts, the *register* (1) and the *scale* (2). The register is a solid bar of black-lead earthenware, A, 8 in. long, cut out of a common black-lead crucible. In the axis of this, a hole is drilled, reaching from one end of the bar to within half an inch of the other extremity; and in this cylindrical cavity a bar *aa*, of metal (as platinum or iron, for example) is placed. A cylindrical piece of porcelain, *cc*, sufficiently long to project a short distance beyond the extremity of the black-lead bar, is placed on the top of the metallic bar. This is termed the index, and it is kept firmly in its position by a ring or strap of platinum, *d*, which is tightened by a wedge of porcelain, *e*. When the register is exposed to a high temperature, the expansion of the metallic rod, *aa*, forces the index forward; and when the register has afterward cooled, the tension of the strap will retain the index at the furthest point to which it has been protruded. The scale (2) consists of a frame composed of two rectangular plates of brass, *f*, *g*, joined together by their edges at a right angle, and fitting square upon two sides of the register. Near the end of this frame is a small brass plate, *h*, which projects at a right angle. To the extremity of the frame nearest the brass plate is attached a movable arm, D, turning round a fixed center, *i*, and at its free end carrying the arc of a circle, E, the radius of which is 5 in., and, which is accurately graduated into degrees and thirds of a degree. Upon this arm, at the center, *k*, another lighter arm, C, is made to turn, carrying at its longer part a vernier (q.v.), H, which moves on the face of the arc, and divides it into minutes, together with an eye-glass, *l*, to assist the reading; while the shorter part terminates in a knife-edge *m*, turned inwards at a right angle.

To use the instrument, the scale is carefully applied, the brass plate, *h*, being pressed upon the shoulder of the register, and the lighter arm being so placed that the steel point, *m*, may rest on the top of the index in a notch cut for it which coincides with the axis of the rod. The position of the index being then read off on the scale, the register is detached and exposed to the heat to be measured; after it is removed and cooled, it is again placed in the scale, and the new position of the index read off; the difference of the two readings determining the expansion of the metallic bar above that of the black-lead. In order to employ the instrument as a measure of temperature as well as of expansion, prof. Daniell adopted the doubtful assumption that equal increments of length are the effects of equal increments of temperature. For further information on this instrument and its uses, we must refer to the original memoir in the *Philosophical Transactions* for 1830–31.

In the great exhibition of 1851, Mr. Ericsson exhibited in the United States' department a pyrometer in which temperatures were indicated by the tension of a permanent volume of air or of nitrogen gas, which was measured by the reading of a column of mercury under a vacuum. For a description of the instrument, we must refer to the jury report. M. Edmond Becquerel published in 1864 a very complete essay on pyrometry in the *Annales du Conservatoire*.

PYR'OPE, a beautiful and much-prized gem, often called *carbuncle* and *hyacinth* by lapidaries. It is nearly allied to garnet. It is composed of silica, alumina, magnesia, lime, and the protoxides of iron, chrome, and manganese. It is always of a deep red color, and is transparent, or at least translucent. It generally occurs in roundish grains, but rarely in imperfectly cubical crystals. It is found chiefly in Saxony and Bohemia; also at Elie, in Fife, Scotland. The specimens found at Elie are popularly called *Elie rubies*.

PYR'OPHONE, or FLAME ORGAN, a word of Greek origin meaning flame organ, the name of a musical instrument invented by M. Kastner of Paris. The musical tones are produced by circles of small gas jets burning in glass tubes, varying in length and diameter, and arranged like those of an ordinary organ. The jets of flame are spread apart so as to produce the tones, or brought together so as to cause the sound to cease by means of a mechanical contrivance worked by keys like those of a piano-forte.

PYROPH'ORUS (from the Gr. *pyr*, fire, and *phĕro*, I bear) is a term applied to any substances which take fire from the rapidity with which they are oxidized. If iron, cobalt, or nickel be reduced by hydrogen from its oxide at a low red heat, it is obtained in a state of such extreme division as to become incandescent by the oxidizing action of the atmosphere; and the tendency to rapid oxidation is much increased by the interposition of some infusible matter, as a little alumina or magnesia, between the particles of the oxide. This is probably due to the cohesion of the minute particles of the reduced metal being thus mechanically prevented, and the access of air to the surface of each particle being thus facilitated. If tartrate of lead be heated in a tube till the organic portion becomes charred, the metallic lead is reduced to a state of extreme subdivision, and usually takes fire when poured into the air. If finely-powdered sulphate of potash be mixed with half its weight of lamp-black, and heated in a covered crucible, the sulphate is reduced to sulphide of potassium, which remains in a finely-divided state, mixed with the excess of carbon, and takes fire spontaneously in the air from the rapid absorption of oxygen. These are among the best examples of pyrophori.

PYRO'SIS, or WATERBRASH, is a modification of dyspepsia, or indigestion, characterized by a burning sensation at the pit of the stomach, followed by the eructation of a considerable quantity of a thin, watery fluid, which is generally tasteless, but sometimes sour, and is often described by the patient as being cold. It occurs in paroxysms, which usually come on in the morning or forenoon, when the stomach is empty. The first symptom of it is a pain at the pit of the stomach, and a sense of constriction, as if the stomach were drawn toward the back. The pain is often very severe, and after continuing for some time it brings on the discharge of fluid which has been already mentioned, after which it lessens, and gradually disappears. When the attack has once occurred, it is commonly repeated at intervals for a considerable time. It is usually accompanied with other symptoms of dyspepsia, and is sometimes associated with organic disease of the stomach or of the liver. It seems to be due in a great measure to indigestible diet and the too free use of spirits. When no organic disease is present, the affection usually disappears under the use of a well-regulated diet, and the administration of opium, combined with astringents (as in the compound kino powder), care being taken to guard against the constipating effect of these drugs by the prescription of a mild aperient daily, as, for example, a little confection of senna, or 3 grains of the compound colocynth pill, combined with 2 grains of extract of hyoscyamus. If this treatment fail, nitrate of bismuth, or oxide of silver, in appropriate doses, may be tried. In some cases a cure has been effected by the use of lime-water and milk.

PYROSOM'IDÆ, a family of tunicated mollusks forming the order *dactylobranchiata* of Owen. They are marine, and swim freely in the water, many individuals usually combined together, by their elastic integument or *tunic,* into a mass of definite form and arrangement, nearly cylindrical, hollow, closed at one end, and open at the other. The individuals which form this group or mass have each a gill-sac with two gills, and inhale water by an orifice on the outer surface of the cylinder, expelling it by another orifice on the inner surface; and by the action of the stream of water, which thus constantly flows from the open end of the cylinder, the whole mass is slowly propelled through the water with the closed end foremost. The pyrosomidæ are plentiful in warm seas. *Pyrosoma Atlanticum* is usually from three to seven inches long. The Pyrosomidæ are brightly luminous.

PY'ROTECHNY, the art of making fireworks, is of unknown antiquity. It was practiced among the Chinese from the earliest times, and has attained with them a perfection unknown in other countries. So much is this the case, that they treat as insignificant the most brilliant of our European displays. In their fireworks they introduce many surprises, such as figures of men and animals darting out, but they are somewhat deficient in the mechanical arrangements. Fireworks, as the name is now understood, were hardly known in Europe until the discovery of the composition of gunpowder, and for a long time only very simple pyrotechnic contrivances were used. At present they may be divided into two kinds—the simple hand pieces, such as squibs, crackers, rockets, etc.; and the other, the fixed contrivances which have often very ingenious mechanical arrangements for making some of their parts revolve rapidly when being discharged. The materials used are gunpowder, sulphur, charcoal, saltpeter, filings of steel, iron, copper, etc., and several salts, such as nitrate of strontian, acetate of copper, common salt, etc. The ingredients of fireworks are usually filled into paper cases, made by rolling pasted paper round a cylinder of wood, of the proper diameter, until the case is of sufficient thickness, and then cutting the paper tube so formed into the required lengths for squibs, Roman candles, small rockets, and similar articles; they seldom exceed ten inches; one end of each is closed by drawing a piece of string tightly round, so as to pinch it in, or *choke* it, as it is technically called, and then dipping it into melted resin, which effectually seals it. The combustible ingredients are filled in at the open end, and, if necessary, are rammed down with a wooden ramrod; the opening is afterward covered with a piece of touch-paper, to prevent the composition falling out, and to ignite it by. The effects produced by fireworks are either streams of fire issuing straight out of the cases, and much varied with sparks in the form of stars, etc., and colored with brilliant colors, or wheels of beautiful sparks produced by making the cases revolve rapidly. Revolving pieces are made by coiling the paper tube, when not too tightly filled, around a flat wooden center; the force with which the combustion of the materials is carried on, is sufficient to make the board revolve with great rapidity. Small wheels of this kind are called *Catherine wheels.* *Squibs* or *serpents* are made by filling tubes, eight to ten inches in length, with a composition of 1 lb. of niter, 2 oz. of charcoal powder (rather coarse), 4 oz. of gunpowder, 4 oz. of sulphur, and 6 oz. of steel filings. The last is an important ingredient in many fireworks, producing brilliant, feather-like coruscations, which are the more beautiful the larger and cleaner the filings are. *Rockets* are tied to a wooden stick. When they are about to be discharged, this stick is stuck in the ground, and in that position the igniting point of the rocket is downward; when lighted, it rushes into the air with great velocity, and reaches a considerable height, discharging as it goes a brilliant stream of sparks. Rockets require a hollow center all down the tube; without this they will not rise. At the end of their course, they often discharge brilliant clusters of golden, ruby, emerald, sapphire-like stars, or showers of golden or colored rain, or of fiery serpents. This is produced by a supplementary part, called the *garniture* of the rocket, consisting of a shorter and broader paper tube, called the *pot*, attached to the end of the fusee part of the rocket, and filled with a composition made into a paste with pure alcohol, and cut into stars, or granulated into small round bodies for drops. The serpents for rockets are small fusees, with the same composition as squibs; they are so packed in as to ignite all at once. The white stars are made of niter, 16 parts; sulphur, 8 parts; gunpowder, 3 or 4 parts; nitrate of strontian added, makes them ruby red; sulphate or acetate of copper, and sulphate and carbonate of barytes, green; zinc filings give a blue color. *Yellow stars* and *yellow showers* are made of niter, 16 parts, 10 of sulphur, 4 of charcoal, 16 of gunpowder, and 2 of lamp-black. A deeper and richer golden color is produced by a very slight variation in the composition—viz., 2 parts less of sulphur and charcoal, and 4 additional of gunpowder. Many other ingenious devices are used by masters in the art of pyrotechny, but they are too numerous and too technical to come within the limits of this work. The *Roman candle* is a favorite firework; it is a tube which is held on the ground, and discharges upward a continuous stream of blue or white stars or balls. *Bengal lights* are cases of about an inch or more in diameter, filled with a composition of 7 parts niter, 2 of sulphur, and 1 of antimony. These are much used as signals at sea; they diffuse an immense glare of bluish-white light. *Chinese* or *jasmine fire*, which is used by itself or in combination with other mixtures, consists of 16 parts of gunpowder, 8 of niter, 3 of finely-powdered charcoal, 3 of sulphur, and 10 of small cast-iron borings; the last must be finer or coarser in proportion to the bore of the case to be filled. The compound devices in fixed fireworks, such as are seen at public entertainments, are very complicated in their structure, and are varied more or less by every artist. One nice point in the arrangement is to insure simultaneous ignition of all the various parts.

PY'ROXENE. See AUGITE.

PYROXY'LIC SPIRIT, WOOD SPIRIT, or METHYLIC ALCOHOL, a peculiar alcohol obtained by the destructive distillation of wood in the manufacture of pyroligneous acid (q.v.). It is one of numerous volatile products of that distillation, and has to be separated from the others by saturating it with the chloride of calcium, with which it combines, and is no longer volatile, except at a greater temperature than 212° F. It is therefore easily separated by means of a steam-bath from its more volatile associates, which are carried off at a temperature below boiling water. A higher temperature is afterward applied to the residue, which is the compound of chloride of calcium and pyroxylic spirit, and the spirit is thus distilled off. Commercially, the discovery of this substance was of great importance, as many of its properties are the same as those of common alcohol; and now, notwithstanding a long opposition from the revenue board, its manufacture and importation are regularly allowed. It is of nearly equal value to alcohol in making varnishes, as it dissolves the resins, oils, and other similar substances. It has a peculiar naphtha-like odor, which is inseparable from it, and prevents its use as a potable spirit at present; but it has been asserted lately that some makers have almost made it odorless, and that it is consequently taking the place of common alcohol in the manufacture of cheap perfumes.

PYROX'YLIN, a name for gun-cotton (q.v.).

PYRRHA. See DEUCALION, *ante*.

PYRRHIC DANCE, the most famous of all the war dances of antiquity, is said to have received its name from one Pyrrichos, or, according to others, from Pyrrhus or Neoptolemus, the son of Achilles. Critical scholars, however, content themselves with a general inference deduced from the substantial harmony of the various mythical or legendary accounts given of its origin—viz., that it was a Doric invention. It was danced to the flute, and its time was both quick and light, as may be seen from the Pyrrhic foot, composed of two shorts (˘˘), and the prokeleusmatic, or challenging-foot, of two double-shorts (⏖ ⏖). According to Plato, it aimed to represent the nimble motions of a warrior either avoiding missiles and blows, or assaulting the enemy; and in the Doric states it was as much a piece of military training as an amusement. Elsewhere in Greece it was purely a mimetic dance, in which the parts were sometimes represented by women. It formed part of the public entertainments at the panathenaic festivals. Julius Cæsar introduced it at Rome, where it became a great favorite. The *Romaika*, still danced in Greece, is said to be a modern relic of the ancient Pyrrhic dance; but if Dr. Corrigan's description of it (*Ten Days in Athens*, 1861) is correct, it is not easy to see the resemblance.

PYRRHON (Lat. *Pyrrho*), the founder of a school of Greek skepticism, named after him, was a native of Elis, and was born in the first half of the 4th c. B.C. In his youth he is said to have been a painter, but was subsequently attracted to philosophy by the study of the writings of Democritus. Diogenes Laertius tells us that, along with Anaxarchus (one of his teachers, according to Aristocles), he joined Alexander the great's eastern expedition; and it has been conjectured that, at this period he obtained some knowledge of the opinions and beliefs of the Persian magi and the Indian gymnosophists. He died about the age of 90, after spending a great part of his life in retirement. Pyrrhon's skepticism was by no means of the thorough-going kind that is usually associated with his name, which is synonymous with absolute and unlimited infidelity. He certainly disbelieved in the possibility of acquiring a scientific knowledge of things, but (like Kant) he appears to have tenaciously maintained the reality of virtue and the obligations of morality. So greatly was he reverenced by his townsmen, on account of his personal excellences, and so little did they consider his philosophical skepticism a barrier to his holding a religious office, that they chose him high-priest of their sacred city, and for his sake declared all philosophers exempt from public taxes. Cicero (not so far wrongly either) ranks him among the Socratics; and, indeed, he was as much opposed to the pretensions of the sophists as Socrates himself, though from a different point of view. Pyrrhon, so far as we know, wrote nothing, and the works of his friend and follower, Timon, are lost.

PYRRHUS, King of Epirus, b. about 318 B.C., a Greek warrior, whose personal bravery and passion for adventurous exploits equals anything recorded of the knights of chivalry, was the son of Æacides, who succeeded to the throne of Epirus by the death of his cousin, Alexander, 326 B.C. Alexander was the brother of Olympias, the mother of Alexander the great; and thus young Pyrrhus was a distant kinsman of the Macedonian hero, whose career of far-stretching conquest he dared to dream of imitating. After experiencing many vicissitudes of fortune in his youth, he became sole king of Epirus in 295 B.C.; and, in the following year, increased his territories by the addition of the western parts of Macedonia, which he obtained in reward for aiding Alexander, son of Cassander, against his brother, Antipater, in their struggle for the paternal inheritance. In 281 B.C. a glorious prospect opened up before the eyes of the restless warrior—nothing less than the conquest of Rome and the western world, which (if he should achieve it) would confer on him a renown equal to that of his Macedonian kinsman. The Tarentines, a Greek colony in lower Italy, then at war with the Romans, sent an embassy to Pyrrhus, in the name of all the Greek colonies in Italy, offering him the command of all their troops against their enemies. The king was overjoyed at the proposal; instantly accepted it; and in the beginning of 280 B.C. sailed for Tarentum with 20,000 foot, 3,000 horse, 2,000 archers, 500 slingers, and a number of elephants. The gay, pleasure-loving Tarentines had no great relish for the rigorous service of war, and were far from pleased at the strict measures taken by Pyrrhus to inure them to its hardships. The first battle between Pyrrhus and the Romans (who were commanded by the consul, M. Valerius Laevinus) took place at the river Siris in Lucania. The contest was long, obstinate, and bloody; and Pyrrhus only succeeded by bringing forward his elephants, whose strange appearance and gigantic size excited a sudden panic among the Romans. It was a hard-bought victory for Pyrrhus, who said, as he looked upon the field, thick-strewn with his numerous dead, "Another such victory, and I must return to Epirus alone." Many of the Italian nation now joined Pyrrhus (for Rome was not liked by her neighbors and dependants), and he proceeded on his march toward central Italy. The Roman senate was thoroughly frightened, and would have come to terms with Pyrrhus but for the stirring speech of old Ap. Claudius Cæcus, which made them resolve to "fight it out" with the foreigner. Pyrrhus, after penetrating to within 20 m. of Rome, found it impossible to proceed further with safety, as one Roman army occupied the city, and another hung upon his flanks and rear. He therefore withdrew to Campania, and thence to Tarentum, where he wintered. The campaign of 279 B.C. was carried on in Apulia, and the principal engagement took place near Asculum. The Romans were again defeated; but Pyrrhus himself lost so heavily that he felt it impossible to follow up his victory, and again withdrew to Tarentum. Here a truce was entered into between the belligerents, and Pyrrhus passed over into Sicily to assist the Sicilian Greeks against the Carthaginians, 278 B.C. His first exploits in that island were both brilliant and successful; but the repulse which he sustained in his attack on Lilybæum broke the spell which invested his name. Soon afterward he became involved in misunderstandings with the Greeks, and in 276 B.C. he quitted the island in disgust, to renew his war with Rome. While crossing over to the mainland the Carthaginians attacked him, and destroyed 70 of his ships, and although he reached Tarentum in safety, his prospects were now much more clouded than at first. In 274 B.C. he fought a great battle with the Romans, under the consul Curius Dentatus, near Beneventum, and was utterly defeated, escaping to Tarentum with only a few personal attendants. He now saw himself forced to abandon Italy and return to Epirus, where he almost immediately engaged in war with Antigonus Gonatas, son of Demetrius, and king of Macedonia. His success was complete, for the Macedonian troops deserted to him *en masse*, and he once more obtained possession of the country; but nothing could satisfy his love of fighting, and in less than a year he was induced to enter on a war with the Spartans. He marched a large force into the Peloponnesus, and tried to take their city, but was repulsed in all his attempts. He then proceeded against Argos, where he met his death, 272 B.C., in the 46th year of his reign.

PY'RUS, a genus of trees and shrubs of the natural order *rosaceæ*, suborder *pomeæ*, having a 5-celled fruit, with a cartilaginous endocarp and two seeds in each cell. It includes species differing very much in appearance, in foliage, and in almost everything except the characters of the flower and fruit, and formerly constituting the genera *sorbus*, *aria*, *aronia*, etc.; or included in *mespilus* (see MEDLAR) and *cratægus*. Some botanists separate the apples (*malus*) as a distinct genus. Among the species of pyrus are some of the most valuable fruits of temperate climates, and some highly ornamental trees and shrubs. See APPLE, PEAR, SERVICE, ROWAN, BEAM-TREE.

PYTHAG'ORAS. The life of this celebrated man, the founder of what is known as the Italic school of philosophy, has been so greatly obscured by the mass of legends and incredible stories which gathered in later ages round his name that it is very difficult to arrive at anything like certainty regarding his history and character. That he was a native of the island of Samos, the son of Mnesarchus, a merchant, or, according to other accounts, a signet-engraver, we know on good authority. The date of his birth is very uncertain, but is usually placed about the year 570 B.C.; and all authorities agree that he flourished in the times of Polycrates and Tarquinius Superbus (540–510 B.C.). He is said to have been a disciple of Pherecydes of Syros, of Thales, and Anaximander, and, like other illustrious Greeks, to have undertaken extensive travels for the purpose of adding to his knowledge, in the course of which—lasting, we are told, for nearly 30 years—he visited Egypt (bringing with him, according to the usual story, letters of introduction from Polycrates to Amasis the king) and the more important countries of Asia, including even India. We have every reason to believe that he did, at all events, visit Egypt, and there availed himself of all such mysterious lore as the priests could be induced to impart, from whom possibly he learned the doctrine of metempsychosis, or the transmigration of souls (which was, as is well known, one of the most famous tenets of the Pythagorean school), and whose influence may perhaps be traced in the mystic rites, asceticism, and peculiarities of diet and clothing which formed some of its chief characteristics—though we may consider it as nearly certain that his philosophic and religious system was much less indebted to the influence of other countries than the ancients generally believed. During his travels, we may believe, Pythagoras matured the plans which he afterward carried into action; but finding, on his return to his native island, that the tyranny established there by Polycrates unfitted it for his abode, he quitted Samos, and eventually settled in the city of Croton, in southern Italy. Here he is said to have acquired in a short time unbounded influence over the inhabitants, as well as over those of the neighboring state; and here he established the famous Pythagorean fraternity, or order, which has often been compared with the still more celebrated order founded by Ignatius Loyola in modern times. The adherents of Pythagoras were chiefly found among the noble and the wealthy; these, to the number of 300, he formed into a select society, bound by a sort of vow to himself and to each other, for the purpose of studying the philosophical system of their master and cultivating the ascetic observances and religious rites enjoined by him. They thus formed at once a philosophical school and a religious brotherhood, which gradually assumed the character and exercised the power of a political association also. This political influence, which undoubtedly became very great, was constantly exerted on the side of aristocracy; and to carry out the principles of this form of government, understood in the best sense of the word, seems to have been the ultimate aim of Pythagoras. He is said also to have increased his influence by a practice unknown to the other sages of the ancient world—the admission of women, not probably into his society, but to attendance on his lectures and teaching. Of the internal arrangement and discipline of this fraternity we really know but little. All accounts agree that what was done and taught among the members was kept a profound secret from the outer world. In the admission of members, Pythagoras is said to have exercised the greatest care, and to have relied much on his skill in physiognomy. They then had, it is said, to pass through a long period of probation, intended apparently to test especially their powers of endurance and self-restraint—though probably the assertion that they had to maintain silence for two, or even five years, is an exaggeration of later times. Among the members of the society we are told there were several gradations, and there was also a more general division of his disciples under the names *esoteric* and *exoteric*—the former being applied to all who were admitted to the more abstruse doctrines and sublimer teaching of their master; the latter, to those who received only the instruction open to all. The mode of life seems to have been regulated by Pythagoras in its minutest details. It is well known that he is said to have forbidden all animal food—a consequence, perhaps, of the doctrine of metempsychosis—and also particularly beans (but these statements cannot be relied on), and there is no doubt that temperance of all kinds was strictly enjoined. In the course of instruction, great attention was paid to mathematics, music, and astronomy; and gymnastics formed an important part of the training. Religious teaching was inculcated in the so-called Pythagorean *orgies*, or *mysteries;* and while he outwardly conformed to the usual mode of worship, there is reason to believe that in secret he taught a purer faith. The result of the whole system seems to have been an unbounded reverence on the part of the disciples for their master (of which the well-known *ipse dixit* is a sufficient attestation); in the members of the order an elevated tone of character, exhibited in serenity of mind and self-possession, extreme attachment to each other, and also supreme contempt for all the outer world. But it was natural that political power, uniformly exercised in one direction by an aristocratic and exclusive society such as this, should in the end excite a wide-spread feeling of jealousy and hatred, which at length, when opportunity was given, caused the overthrow of the fraternity. A war between the cities of Croton and Sybaris, in which the Pythagoreans took a prominent part, ended in the total destruction of the latter city (510 B.C.); and on this success they seem to have presumed so greatly, that they proceeded to more active measures against the popular party than they had yet attempted. A violent outbreak was the consequence; the house in which the leading Pythagoreans were assembled was set on fire, and many perished in the flames. Similar commotions ensued in other cities of southern Italy in which Pythagorean clubs had been formed, and the result was that, as a political organization, the Pythagorean order was everywhere suppressed; though, as a philosophical sect, it continued to exist for many years after. Of the fate of Pythagoras himself different accounts are given; but he is generally supposed to have escaped to Metapontum, and died there (504 B.C.), where his tomb was shown in the time of Cicero.

Pythagoras is said to have been the first to assume the title of *philosopher* ("lover of wisdom") in place of the name *sophos* ("wise"), by which the sages had before been known. Various discoveries in music, astronomy, and mathematics are attributed to him; among others, the proposition now known as the 47th of Euclid, Book I. We have good ground for believing that he was a man of much learning and great intellectual powers, which were specially exerted in the way of mathematical research, as is evinced by the general tendency of the speculations of his school. There is no doubt that he maintained the doctrine of the transmigration of souls into the bodies of men and other animals—which seems to have been regarded in the Pythagorean system as a process of purification—and he is said to have asserted that he had a distinct recollection of having himself previously passed through other stages of existence. We are told that on seeing a dog beaten, and hearing him howl, he bade the striker desist, saying, "It is the soul of a friend of mine, whom I recognize by his voice."

Respecting the system of philosophy actually taught by Pythagoras, we have but little trustworthy testimony. Pythagoras himself, it is all but certain, wrote nothing, and the same seems to have been the case with his immediate successors; we are therefore, in endeavoring to form an idea of the Pythagorean philosophy, obliged to rely almost entirely on the compilations of later writers (mainly Diogenes Laërtius, and the Neo-Platonists, Porphyrius and Iamblichus, all of them long subsequent to the Christian era), who often but imperfectly understood the details they gave. The tendency of the school was "toward the consideration of abstractions as the only true materials of science" (Lewes's *Biographical History of Philosophy*), and to *number* was allotted the most prominent place in their system. They taught that in number only is absolute certainty to be found; that number is the essence of all things; that things are only a copy of numbers; nay, that in some mysterious way, numbers are things themselves. This number theory was probably worked out from the fundamental conception, that, after destroying or disarranging every other attribute of matter, there still remains the attribute number; we still can predicate that the thing is *one*. With this doctrine of number was intimately connected that of the *finite* and the *infinite*, corresponding respectively with the *odd* and the *even* in number; and from a combination of this finite and infinite it was taught that all things in the universe result. The abstract principle of all perfection was *one* and the *finite*; of imperfection, the *many* and the *infinite*. Essentially based also on the same doctrine was the theory of music; the system of the universe, which was conceived as a *kosmos*, or one harmonious whole, consisting of ten heavenly bodies revolving round a central fire, the *hearth* or *altar* of the universe; and the celebrated doctrine of the harmony of the spheres—the music produced, it was supposed, by the movement of these heavenly bodies, which were arranged at intervals according with the laws of harmony—forming thus a sublime musical scale. The soul of man was believed to partake of the nature of the central fire, possessing three elements, reason, intelligence, and passion; the first distinctive of man, the two last common to man and brutes.

The ethical teaching of the Pythagoreans was of the purest and most spiritual kind; virtue was regarded as a harmony of the soul, a conformity with, or approximation to, the Deity; self-restraint, sincerity, and purity of heart were especially commended; and conscientiousness and uprightness in the affairs of life would seem to have been their distinguishing characteristics.

The Pythagorean system was carried on by a succession of disciples down to about 300 B.C., when it seems to have gradually died out, being superseded by other systems of philosophy; it was revived about two centuries later, and lasted for a considerable time after the Christian era—disfigured by the admixture of other doctrines, and an exaggeration of the mysticism and ascetic practices, without the scientific culture of the earlier school.

In addition to the writers above mentioned, scattered and scanty notices—affording, however, really the most trustworthy information that we possess, as to the life and doctrines of Pythagoras—occur in Herodotus, Plato, Aristotle (the latter especially), and a few other authors. Fuller details on the subject will be found in the histories of Greece by Thirlwall and Grote, in the works of Ritter, Brandis, Tennemann, Erdmann, Ueberweg, and Lewes on the *History of Philosophy;* in Zeller's *Philosophie der Griechen,* and Ferrier's lectures on the same subject; and in Smith's *Dictionary.*

PYTHEAS, b. Massilia, B.C. 4th c.; said to have sailed around the w. coast of Europe, and through the English channel to Thule (supposed to be the modern Iceland). Nothing is accurately known about his life. He gave an account of his first voyage in his *Description of the Ocean,* in which he stated that he traveled through Britain, and that its circumference was over 40,000 stadia. In regard to the island of Thule, he said there was neither air, nor land, nor sea, but a composition of all of them, in which the whole universe was suspended. This substance, which could not be penetrated by land or sea, he had himself seen, and was told that it was "a connecting link of the universe." He puts Thule 6 days' sail from Britain. It seems that he went as far as Iceland, from his observation that the sun never sets during the summer solstice in Thule. On a second voyage he skirted the w. shore of Europe, from Cadiz into the Tanais, a river emptying into the Baltic. He was also a mathematician and astronomer, and was the first to determine the meridian altitude of the sun at the summer solstice by the use of a gnomon. The fragments of his writings were collected and published at Upsala in 1824. Polybius and Strabo speak of him contemptuously, but modern geographers are more favorable in their judgment. It is supposed that he was sent out by the Massilians for the purpose of increasing their commercial connections.

PYTH'IA. See DELPHI, *ante.*

PY'THIAN GAMES, one of the four great national festivals of the Greeks, held in the Crissæan plain, near Delphi, are said (according to the prevalent mythological legend) to have been instituted by Apollo after vanquishing the snaky monster, Python, and were certainly in the earliest times celebrated in his honor every ninth year. They were at first under the management of the Delphians, but about 590–586 B.C. the Amphictyons were intrusted with the conduct of them, and arranged that they should be held every fifth year. Some writers state that it was only *after* this date that they were called Pythian. Originally, the contests were restricted to singing, with the accompaniment of cithern-playing; but the Amphictyons added the flute, athletic contests, and horse-racing. By and by, contests in tragedy, and other kinds of poetry, in historical recitations, and in works of art, were introduced, and long continued a distinguishing feature of these games, which are believed to have lasted down to nearly the end of the 4th c. A.D. The prize was a laurel wreath and the symbolic palm-branch. Several of Pindar's extant odes relate to victors in the Pythian games.

PYTH'IAS. See DAMON AND PYTHIAS, *ante.*

PY'THON, a genus of serpents of the family *boidæ* (see BOA), differing from the true boas in having the plates on the under surface of the tail double. The tip of the muzzle is plated; the lips are grooved. The species are all natives of the old world. They are all large; some of them very large, and rivaled in size by no serpents except the boas of America. The name boa is often popularly given to the pythons, and in its ancient use belongs to them. Some of the pythons are known in the East Indies by the name of ROCK SNAKE, as *P. molurus,* a species very extensively diffused. This name is given to some species which belong to the genus or subgenus *hortulia,* one of which, the NATAL ROCK SNAKE (*H. Natalensis*), is said to attain so large a size that its body is as thick as that of a man. Although a native of Natal, it is already unknown in the settled parts of the colony. *Python reticulatus* is probably the largest snake of India and Ceylon. It is found also in more eastern regions. What size it attains is not well known. Specimens of 15 or 20 ft. long are common, but it certainly attains a much larger size. It seems to be this snake which is sometimes called ANACONDA. It is rather brilliantly colored, its body being covered with gold and black, finely intermixed. The forehead is marked by a longitudinal brown stripe. Although sluggish for some time after a repast, it is at other times very active, and easily scales the highest garden walls. It feeds on deer and smaller animals; but the largest pythons are said to seize buffaloes, tigers, and even elephants, and to crush them in their coils. In this there is perhaps some exaggeration; but there are well-authenticated stories of snakes in the East Indies quite capable of killing at least the buffalo and the tiger (see *My Indian Journal,* by col. Walter Campbell; Edin. 1864, pp. 126, 127).

PYX (Gr. *pyxis,* a box, properly of boxwood), the sacred vessel used in the Catholic church to contain the consecrated eucharistic elements, which are preserved after consecration, whether for the communion of the sick or for the adoration of the faithful in the churches. Its form has varied very much at different times. Anciently it was sometimes of the form of a dove, which was hung suspended over the altar. More commonly, however, it was, as its name implies, a simple box, generally of the precious metals, or, at least, of metal plated with goldor silver. At present, the pyx is commonly cup-shaped, with a close-fitting cover of the same material. The interior is ordered to be of gold, or at least plated with gold. Like all the other sacred utensils connected with the administration of the eucharist, it must be blessed by a bishop, or a priest delegated by a bishop.

PYX, Trial of the, the final trial by weight and assay of the gold and silver coins of the United Kingdom, prior to their issue from the mint. It is so called from the pyx, i.e.; box or chest, in which are deposited specimen coins. When the coins are weighed into bags at the mint, two pieces are taken out of each bag, one for assay within the mint, the other for the pyx. The latter are sealed up by three officers and deposited in the chest or pyx. The trial takes place about once in three years by a jury of goldsmiths, summoned by the lord-chancellor. The jury are charged by the lord-chancellor, at the exchequer office, Whitehall, in the presence of several privy-councilors, and of the officers of the mint. Being furnished with a piece of gold and silver from the trial plates deposited in the exchequer, they are required to declare to what degree the coin under examination deviates from them. The jury then proceed to Goldsmith's hall, where assaying apparatus is in readiness, and the sealed packets of coin being delivered to them by the officers of the mint, are first tried by weight, after which a certain number of pieces taken from the whole are melted into a bar, from which the assay trials are taken. A favorable verdict relieves the officers of the mint from responsibility, and constitutes a public attestation of the standard purity of the coin.

Q

Q, THE seventeenth letter of the Latin, English, and other western alphabets, is identical in power with the letter K (q.v.). It is always followed by *u*.

QUA BIRD, or Quawk. See Night Heron, *ante*.

QUACKENBOS, George Payn, ll.d., b. N. Y., 1826; educated at Columbia college; began the study of law in New York. In 1847 he opened a private school in the city and remained at its head for about 20 years. In 1848 he began to publish the *Literary American*, and continued it for two years. He was the editor of the American edition of Spier and Surenne's French and English Lexicon; has published a novel and some translations, but is best known as the author of a series of text-books very widely used in the schools of the United States. Included in this series are treatises on grammar, arithmetic, U. S. history, natural history, English composition, and rhetoric.

QUADI, an ancient people living in s.e. Germania; of the Suevic race, and inhabiting that part of what is now Bohemia, Lower Austria, and Moravia, which lay between the Sarmatian mountains and Hercynian forests and the Ister or Danube. They were allies of the Marcomanni, their neighbors on the n.w. The Roman emperor Tiberius established a kingdom of the Quadi and made Vannius, one of his generals, king. In 174 b.c. the Quadi, rose against the empire in confederation with other Germanic races, and it was only after stubborn resistance that they were overcome.

QUADRAGES'IMA (Lat. "fortieth day"), the name of the lenten season, or more properly of the first Sunday of the lent. It is so called by analogy with the three Sundays which precede lent, and which are called respectively Septuagesima, 70th; Sexagesima, 60th; and Quinquagesima, 50th.

QUADRAN'GLE, an open square, or court-yard having four sides. Large public buildings—such as Somerset house and the colleges of Oxford and Cambridge—are usually planned in this form.

QUAD'RANT (Lat. *quadrans*, a fourth part) literally the fourth part of a circle, or 90°; but signifying, in astronomy, an instrument used for the determination of angular measurements. The quadrant consisted of a limb or arc of a circle equal to the fourth part of the whole circumference, graduated into degrees and parts of degrees. The quadrant employed by Ptolemy was of stone, with one smooth and polished side, on which the graduations were made; the quadrant was firmly placed in a meridian plane, with one radius vertical, and the other horizontal. Tycho Brahe, who has a right to be considered as the first great practical astronomer of modern times, fixed his quadrant on a wall, and employed it for the determination of meridian altitudes; he also adjusted others on vertical axes for the measurement of azimuths. Picart was the first who applied telescopic sights to this instrument. About this time the large mural quadrant (of 6 to 8 ft. radius) began to be introduced into observatories. These quadrants were adjusted in the same way as the mural circle (see Circle, Mural). Various innate defects of the quadrant as an instrument—such as the impossibility of securing exactness of the whole arc, concentricity of the center of motion with the center of division, and perfect stability of the center-work—led to its being superseded by the repeating circle, otherwise called the *mural circle*.

Hadley's quadrant is more properly an *octant* as its limb is only the eighth part of a circle, though it measures an arc of 90°. Its principle is that of the Sextant (q.v.).

QUADRAT'IC EQUATIONS. See Equations.

QUADRATURE. This term is employed in mathematics to signify the process of determining the area of a surface. Its derivation sufficiently indicates its nature—i.e., it consists in determining a *square* (the simplest measure of surface) whose area is equal to that of the assigned surface. In many cases, of which the triangle (q.v.), the parabola (q.v.), and the cycloid (q.v.) are perhaps the simplest, the area is easily assigned in terms of some simple unit. Thus, the area of a triangle is half that of the rectangle with the same base and height; that of any parabolic segment is two-thirds of the corresponding triangle, whose sides are the chord and the tangents at its extremities; that of the cycloid three times that of its generating circle, etc.

The term is also applied in a special sense in cases in which an area or other quantity is expressed by an integral, whose value cannot be determined exactly; and it then means the process of approximation by which the value of the integral can be gradually arrived at.

All the practical rules for approximating to the areas of curvilinear figures, and the volumes of various solids—such as occur in land-measuring, gauging, engineering, etc.—are, in this sense, cases of quadrature, except in those very special cases in which an area or a volume can be assigned exactly as a finite function of its dimensions. See **MENSURATION.**

QUADRATURE OF THE CIRCLE. This is one of the grand problems of antiquity, which, unsolved and probably unsolvable, continue to occupy even in the present day the minds of many curious speculators. The trisection of an angle, the duplication of the cube, and the perpetual motion have found, in every age of the world since geometry and physics were thought of, their hosts of patient devotees. The *physical* question involved in the perpetual motion (q.v.) is treated of under that head; and we shall now take the opportunity of noticing the *mathematical* questions involved in the other problems above mentioned; but more especially that of the quadrature of the circle, in which the difficulty is of a different nature from that involved in the other two geometrical ones. A few words about them, however, will help as an introduction to the subject.

According to the postulates of ordinary geometry, all constructions must be made by the help of the circle and straight line. Straight lines intersect each other in but *one* point; and a straight line and circle, or two circles, intersect in *two* points only. From the analytical point of view we may express these facts by saying that the determination of the intersection of two straight lines involves an equation of the *first* degree only; while that of the intersection of a straight line and a circle, or of two circles, is reducible to an equation of the second degree. But the trisection of an angle, or the duplication of the cube, requires for its accomplishment the solution of an equation of the *third* degree; or, geometrically, requires the intersections of a straight line and a curve of the third degree, or of two conics, etc., *all of which are excluded by the postulates of the science.* If it were allowed that a parabola or ellipse could be described with a given focus and directrix, as it is allowed that a circle can be described with a given radius about a given center, the trisection of an angle and the duplication of the cube would be at once brought under the category of questions resolvable by pure geometry; so that the difficulty in these cases is one of mere restriction of the postulates of what is to be called geometry.

It is very different in the case of the quadrature of the circle, which (the reader of the preceding article will see at once) means the determination of the area of a circle of given radius—literally, the assigning of the side of a square whose area shall be equal to that of the given circle.

The common herd of "squarers of the circle," which grows more numerous every day, and which includes many men of undoubted sanity, and even of the very highest business talents, rarely have any idea of the nature of the problem they attempt to solve. It will, therefore, be our best course to show first of all *what has been done* toward the solution of the problem; we shall then venture a few remarks as to *what may yet be done,* and in what direction philosophic "squarers of the circle" must look for real advance.

In the first place, then, we observe that *mechanical processes are utterly inadmissible.* A fair approximation may, no doubt, be got by measuring the diameter of a circular disk of uniform material, and comparing the weight of the disk with that of a square portion of the same material of given side. But it is almost impossible to execute any measurement to more than six places of significant figures; hence, as will soon be shown, this process is at best but a rude approximation. The same is to be said of such obvious processes as wrapping a string round a cylindrical post of known diameter, and comparing its length with the diameter of the cylinder: only a rude approximation to the ratio of the circumference of a circle to its diameter can thus be obtained.

Before entering on the history of the problem, it must be remarked that the Greek geometers knew that the area of a circle is half the rectangle under its radius and circumference (see CIRCLE), so that the determination of the length of the circumference of a circle of given radius is precisely the same problem as that of the quadrature of the circle.

Confining ourselves strictly to the best ascertained steps in the history of the question, we remark that Archimedes proved that the ratio of the diameter to the circumference is greater than 1 to $3\frac{1}{7}$, and less than 1 $\frac{10}{71}$ to 3. The difference between these two extreme limits is less than $\frac{1}{1500}$ of the whole ratio. Archimedes' process depends upon the obvious truth, that the circumference of an inscribed polygon is less, while that of a circumscribed polygon is greater, than that of the circle. His calculations were extended to regular polygons of 96 sides.

Little more seems to have been done by mathematicians till the end of the 16th c., when P. Métius gave the expression for the ratio of the circumference to the diameter as the fraction $\frac{355}{113}$, which, in decimals, is true to the seventh significant figure inclusive. Curiously enough, it happens that this is one of the convergent fractions which express in the lowest possible terms the best approximations to the required number. Métius seems to have employed, with the aid of far superior arithmetical notation, a process similar to that of Archimedes.

Vieta shortly afterward gave the ratio in a form true to the tenth decimal place, and was the first to give, though of course in infinite terms, an exact formula. Designating, as is usual in mathematical works, the ratio of the circumference to the diameter by π, Vieta's formula is:

$$\frac{1}{\pi} = \frac{1}{2}\sqrt{\frac{1}{2}} \times \sqrt{\frac{1}{2}+\frac{1}{2}\sqrt{\frac{1}{2}}} \times \sqrt{\frac{1}{2}+\frac{1}{2}\sqrt{\frac{1}{2}+\frac{1}{2}\sqrt{\frac{1}{2}}}} \times \text{etc.}$$

Shortly afterward, Adrianus Romanus, by calculating the length of the side of an equilateral inscribed polygon of 1073741824 sides, determined the value of π to 16 significant figures; and Ludolph von Ceulen, his contemporary, by calculating that of the polygon of 36893488147419103232 sides, arrived (correctly) at 36 significant figures. It is scarcely possible to give, in the present day, an idea of the enormous labor which this mode of procedure entails even when only 8 or 10 figures are sought; and when we consider that Ludolph was ignorant of logarithms, we wonder that a lifetime sufficed for the attainment of such a result by the method he employed.

The value of π was thus determined to $\frac{1}{3 \times 10^{35}}$ of its amount, a fraction of which, after Montucla, we shall attempt to give an idea, thus: Suppose a circle whose radius is the distance of the nearest fixed star (250,000 times the earth's distance from the sun), the error in calculating its circumference by Ludolph's result would be so excessively small a fraction of the diameter of a human hair as to be utterly invisible, not merely under the most powerful microscope yet made, but under any which future generations may be able to construct.

These results were, as we have pointed out, all derived by common arithmetical operations, based on the obvious truth that the circumference of a circle is greater than that of any inscribed, and less than that of any circumscribed polygon. They involve none of those more subtle ideas connected with limits, infinitesimals, or differentials, which seem to render more recent results suspected by modern "squarers." If one of that unhappy body would only consider this simple *fact*, he could hardly have the presumption to publish his 3.125, or whatever it may be, as the accurate value of a quantity which by common arithmetical processes, founded on an obvious geometrical truth, was several centuries ago shown to be greater than

$$3.14159265358979323846264338327950288,$$

and less than

$$3.14159265358979323846264338327950289.$$

We now know, by far simpler processes, its exact value to more than 600 places of decimals; but the above result of Von Ceulen is much more than sufficient for any possible practical application even in the most delicate calculations in astronomy.

Snellius, Huygens, Gregory de Saint Vincent, and others, suggested simplifications of the polygon process, which are in reality some of the approximate expressions derived from modern trigonometry.

In 1668 the celebrated James Gregory gave a demonstration of the impossibility of effecting exactly the quadrature of the circle, which, although objected to by Huyghens, is now received as quite satisfactory.

We may merely advert to the speculations of Fermat, Roberval, Cavalleri, Wallis, Newton, and others as to quadrature in general—their most valuable result was the invention of the differential and integral calculus by Newton, under the name of fluxions and fluents. Wallis, however, by an ingenious process of interpolation, showed that

$$\frac{\pi}{4} = \frac{2.4.4.6.6.8.8.10.10.\text{ etc.}}{3.3.5.5.7.7.9.9.11.\text{ etc.}}$$

which is interesting, as being the first recorded example of the determination, in a finite form, of the value of the ratio of two infinite products.

Lord Brouncker, being consulted by Wallis as to the value of the above expression, put it in the form of an infinite continued fraction, thus:

$$\frac{\pi}{4} = \cfrac{1}{1+\cfrac{1}{2+\cfrac{9}{2+\cfrac{25}{2+\cfrac{49}{2+\text{etc.}}}}}}$$

in which 2 and the squares of the odd numbers appear. This formula has been employed to show that not only π, but its square, is incommensurable.

Perhaps the neatest of all the formulas which have been given for the quadrature of the circle is that of James Gregory for the arc in terms of its tangent—namely:

$$\theta = \tan.\ \theta - \tfrac{1}{3} \tan.\ ^{3}\theta + \tfrac{1}{5} \tan.\ ^{5}\theta - \text{etc.}$$

This was appropriated by Leibnitz, and formed perhaps the first of that audacious series of peculations from English mathematicians which have for ever dishonored the name of a man of real genius.

If we notice that, by ordinary trigonometry, the arc whose tangent is unity (the arc of 45° or) $\frac{\pi}{4}$, falls short of four times the arc whose tangent is $\frac{1}{5}$ by an angle whose tangent is $\frac{1}{239}$, we may easily calculate $\frac{\pi}{4}$ to any required number of decimal places by calculating from Gregory's formula the values of the arcs corresponding to $\frac{1}{5}$ and $\frac{1}{239}$ as tangents. And it is, in fact, by a slight modification of this process (which was originally devised by Machin), that π has been obtained, by independent calculators, to 600 decimal places.

It is not yet proved, and it may not be true, that the area or circumference of a circle cannot be expressed in finite terms; if it can be, these must (of course) contain irrational quantities. The integral calculus gives, among hosts of others, the following very simple expression in terms of a definite integral:

$$\frac{\pi}{2} = \int_{0}^{\infty} \frac{dx}{1 + x^2}.$$

Now it very often happens that the value of a definite integral can be assigned, when that of the general integral cannot; and it is not impossible, so far as is yet known, that the above integral may be expressed in some such form as

$$\sqrt{x} + \sqrt{y},$$

where $\sqrt{x}$ and $\sqrt{y}$ are irrational numbers. Such an expression, if discovered, would undoubtedly be hailed as a solution of the grand problem.

But this, we need hardly say, is *not* the species of solution attempted by "squarers." We could easily, from our own experience alone, give numerous instances of their helpless absurdities, but we spare the reader, and refer him, for further information on this painful yet ridiculous subject, to prof. De Morgan's *Budget of Paradoxes;* and to the very interesting work of Montucla, *Histoire des Recherches sur la Quadrature du Cercle.*

QUADRIEN'NIUM U'TILÉ, in Scotch law, means the four years after majority during which a person is entitled to reduce or set aside any deed made to his prejudice during minority. This protection was also given by the Roman law to minors, to enable them to neutralize any unfair advantage that may have been taken of their inexperience during minority. The injury or lesion must have been caused, not by an accident, but by the imprudence or negligence of themselves or of their curators. The proceeding, therefore, must be commenced before the minor attains 25, after which it is too late to seek restitution. See INFANT.

QUADRI'GA. See CHARIOT.

QUADRILAT'ERAL, in military language, is an expression denoting a combination of four fortresses, not necessarily connected together, but mutually supporting each other; and from the fact that if one be attacked, the garrisons of the others, unless carefully observed, will harass the besiegers, rendering it necessary that a very large army should be employed to turn the combined position. As a remarkable instance, and a very powerful one, may be cited the Venetian quadrilateral (Austrian till 1866), comprising the four strong posts of Mantua, Verona, Peschiera, and Legnago. These form a sort of outwork to the bastion which the southern mountains of the Tyrol constitute, and divide the n. plain of the Po into two sections by a most powerful barrier. Napoleon III., in 1859, even after the victories of Magenta and Solferino, hesitated to attack this quadrilateral.

QUADRILLE', a dance of French origin, consisting of consecutive dance movements, generally five in number, danced by couples, or sets of couples, opposite to, and at right angles to each other. The name seems to be derived from its having been originally danced by four couples.

QUADRILLE' is a card game, which, as its name denotes, is played by four persons. The number of cards employed is forty, the tens, nines, and eights being discarded from the pack. The rank and order of the cards in each suit vary according as they are or are not trumps, and are different in the black and red suits. The ace of spades, whatever suit be trumps, is always the highest trump, and is called *spadille;* the ace of clubs is always the third highest trump, and is known as *basto;* while the second highest trump, or *manille,* is the deuce of spades or clubs, or the seven of hearts or diamonds according to the suit which is trumps, it being always of the trump suit. When the black suits are not trumps, the black cards rank as in whist; and when they are trumps, the order is the same, with the exception, as above mentioned, of the deuce, which then (in the trump suit only) becomes manille, the deuce of the black suit which is not trumps retaining its position as the lowest card. When the red suits are not trumps, the order of rank is as follows: king, queen, knave, ace, deuce, three, four, five, six, seven; but when they are trumps, the ace (of the trump suit only) is raised to the position of the fourth highest trump, under the name of *ponto* or *punto*, and the seven (of the trump suit only) becomes, as previously stated, manille. A little consideration will show, that when the black suits are trumps, the number of trump cards is eleven, and twelve when a red suit is trumps. The three highest trumps, spadille, manille, and basto, are called *matadores*, and the player who possesses one of them can, if he have no other trumps in his hand, decline to follow suit if trumps are led, provided the trump led is not a matadore of value superior to his own. After the cards have been shuffled, cut, and dealt, the elder hand, on looking at his cards, may, if his hand be weak, decline to play (or *pass*); the next player may do the same, and so on all round; in which case the elder hand must commence, naming the suit which he wishes to be trumps, and the cards are laid, and the tricks taken, as in ordinary card games. If a player does not pass, but commences the game by naming trumps and playing a card, he must himself make six tricks to win; and if he succeeds, he obtains the whole of the winnings; but if he loses, he pays the whole of the losses. If he commences the game by "asking leave"—i.e., to have a partner—which is done by calling a king, the player who holds the king of the suit led must play it when his turn arrives; and he who asked leave, or *l'hombre* (in England generally called *ombre*), along with him who had the king called, or the *friend*, are from this time partners in the game, and divide either the gains or the losses, as the case may be. The ombre and the friend win the game if they make six tricks between them. This game is complicated by a number of conditions, which, under certain circumstances, modify the ordinary mode of playing.

A modification of this game, under the name of *preference*, is much in vogue in Lancashire; and in this country in the beginning of last century, and on the continent—especially in France—the game of *l'hombre*, which is nothing more than quadrille played by three persons, was exceedingly fashionable. L'hombre is now quite obsolete, but a most accurate description of the mode in which it was played will be found in Pope's *Rape of the Lock*. L'hombre was the immediate predecessor of quadrille in popular favor.

QUADRIVIUM (Lat. *quatuor*, four, and *via*, a road), the name given, in the language of the schools of the west, to the higher course of the mediæval studies, from its consisting of four branches, as the lower course, for an analogous reason, was called trivium (q.v.), or "three roads." The quadrivium consisted of arithmetic, music, geometry, and astronomy. It would carry us beyond our limits to detail the nature and extent of each of these branches as pursued in the mediæval schools. The reader will find much curious and new matter on all questions of this nature in the volumes of the works of Roger Bacon, lately edited in the series issued under authority of the master of the rolls, as also in the introduction prefixed to the volumes.

QUADRUMANA (Lat. four-handed), in the zoological system of Cuvier an order of *mammalia*, which he places next after *bimana* (q.v.), and which contains the animals most nearly resembling man in their form and anatomical characters—viz., the monkey and lemur families. The order quadrumana, with the limits assigned to it by Cuvier, is very generally received by naturalists. The name is derived from a character, in which one most obvious difference from man is, that the extremities of all the four limbs are *hands*, or formed for grasping, and not merely those of the anterior ones; these, indeed, being in many of the monkeys less perfect hands than the hinder ones, through the want or rudimentary character of the thumb. None of the quadrumana are naturally adapted for an erect posture. The differences betwen man and the apes which most nearly approach him in form, are pointed out in the articles MONKEY, CHIMPANZEE, GORILLA, and ORANG. The quadrumana resemble man in their dentition more than any other animals. Their other digestive organs also exhibit a general similarity to those of man. The similarity is further apparent in the brain and in the reproductive organs; but in the *lemuridæ*, a gradual departure from the human form and characters is manifested, with an approach to the ordinary quadruped type.

QUADRUMANA (*ante*). This order comprises the apes, monkeys, baboons, lemurs, etc., and is characterized as follows: The hallux (innermost toe or thumb of the hind-limb) is separated from the other digits and is opposable to them, making the hind-feet really hands. The pollex (innermost toe or thumb of the fore-limb) may be wanting, but when present is usually opposite the other digits, so that the animal is really quadrumanous, or four-handed. The incisor teeth are generally $\frac{2-2}{2-2}$, and the molars $\frac{3-3}{3-3}$, with broad and tuberculate crowns; clavicles or collar-bones perfect; teats two in number, and (except in *cheiromys*) are situated on the anterior thorax; and the placenta is discoidal and deciduate. They are divided by prof. Owen into three groups, separated from one another by their anatomical characteristics and by their geographical distribution as follows: *Section A*, *strepsirhina*, characterized by the nostrils being curved or twisted, and by the second digit of the hind-limb having a claw. This section includes the lemurs and a number of allied forms. Madagascar is regarded as its geographical center, but it is found in Africa and in the East Indian archipelago. See AYE-AYE, LEMUR, LEMURIDÆ, LORIS, and NYCTICEBINÆ. *Section B, platyrhina*, exclusively confined to South America, a chief characteristic being a prehensile tail, adapted to climbing. There are no cheek pouches nor callosities. There is an additional premolar, and sometimes a molar less than in the old-world monkeys. The nostrils are simple, separated by a wide septum, and opening laterally: premolars, $\frac{3-3}{3-3}$, having blunt tubercles. The pollex is wanting, or, if present, but slightly opposable, though having considerable range of motion. The platyrhine monkeys are divided into two principal families, *hapalidæ* and *cebidæ*. Family 1, *hapalidæ*, having the same number of teeth as old-world monkeys, but there is one more premolar and one less molar. They are small monkeys about the size of squirrels, and are chiefly found in Brazil. The best-known species is the *marmoset* (q.v.). See also MIDAS. Family 2, *cebidæ*. This contains the typical platyrhine monkeys, and the dentition differs from that in hapalidæ in having an additional molar, so that the molars are the same as in the old-world monkeys, but the premolars are more numerous. Dental formula: $i\frac{2-2}{2-2}$; $c\frac{1-1}{1-1}$; $pm\frac{3-3}{3-3}$; $m\frac{3-3}{3-3} = 36$. There are no cheek pouches nor callosities; the face is generally more or less uncovered by hair, but sometimes there are whiskers; tail long, generally prehensile. The thumb of the fore-hand is sometimes wanting, but when present is not opposable. All the digits are furnished with flat nails. They live upon fruit and insects. This family contains the spider monkeys (q.v.), howling monkeys (see HOWLER), sapajou (q.v.). *Section C. catarrhina.*—This is the highest section of the quadrumana, and comprises what are collectively called the old-world monkeys. They have oblique nostrils, placed close together, with a narrow septum, the nostrils looking downward. The thumbs of all the members are opposable, and the animal is therefore strictly quadrumanous. In one genus, the African *colobus*, the pollex is wanting. The dental formula is the same as in man: $i\frac{2-2}{2-2}$; $c\frac{1-1}{1-1}$; $pm\frac{2-2}{2-2}$; $m\frac{3-3}{3-3} = 32$. The incisors are projecting and prominent, the canines are large and pointed, and are separated by a diastema or interval from the other teeth. The tail is never prehensile, and is sometimes not present. Cheek pouches, opening in the mouth, and serving to hold food, are often present; and the skin covering the prominences of the ischia is generally callous (forming what are called natal callosities), and destitute of hair. With a single exception of a monkey which inhabits the rock of Gibraltar, all the *catarrhina* are natives of Africa and Asia. There are three well-marked groups of the catarrhine monkeys. The first group has a long tail, with generally cheek pouches and natal callosities. It contains the genus *semnopithecus* (q.v.), but which has no cheek pouches. Allied to this is the proboscis monkey, or kahau. See NASALIS, *ante*. See also MACAQUE and WANDEROO. The second group of catarrhine monkeys comprises the baboon (q.v.); the third group of catarrhine monkeys comprises the anthropoid apes, so named because they appear to make a nearer approach in anatomical structure to man than other monkeys. The members of this group have no tail nor cheek pouches, and some of them no natal callosities. They have a sternum, and are therefore sometimes called *latisternal apes*, and are characterized by the possession of an appendix vermiformis to the cæcum. See ALIMENTARY CANAL, *ante*. The hind limbs are shorter than the fore limbs, and the animal can manage to walk in a semi-erect posture. The canine teeth of the males are long, strong, and pointed; but this is not the case with the females. This group contains the gibbon (q.v.), the orang (q.v.), the genus *troglodytes*, comprising the chimpanzee (q.v.), and the gorilla (q.v.). In regard to the distribution of the quadrumana in time, the earliest representatives of the order are found in the eocene tertiary, in the strata of which in Wyoming territory prof. Marsh has discovered several lemuroids and some nearly related forms. One of the genera of the former, *lemuravus*, has the following dental formula: $i\frac{3-3}{3-3}$; $c\frac{1-1}{1-1}$; $pm\frac{4-4}{4-4}$; $m\frac{3-3}{3-3} = 44$. The genus *limnotherium*, which shows some affinities with the South American marmosets, has only 40 teeth. The following is the dental formula: $i\frac{2-2}{2-2}$; $c\frac{1-1}{1-1}$; $pm\frac{4-4}{4-4}$; $m\frac{3-3}{3-3} = 40$. "The brain was nearly smooth, and the cerebellum large, and placed mainly behind the cerebrum. The orbits are open behind, and the lachrymal foramen is outside the orbit" (Marsh). There are also found the remains, in the miocene of North America, of the genus *laopithecus*, which is allied both to *limnotherium* and to some of the South American platyrhine monkeys. In South America fossils of platyrhine monkeys have been found in late tertiary or post-tertiary which are referred to existing genera, *cebus* and *iacchus;* also a large fossil belonging to an extinct genus, *protopithecus*, allied to the recent *mycetes*. No fossil platyrhines have been found in formations older than post-pliocene, nor in any other country in deposits of tertiary age. The earliest traces of catarrhine monkeys appear in the miocene, and as far as known, occur only in the old world, where they are found in the miocene of France and Italy, as *pliopithecus*, apparently allied to *semnopithecus*. The *dryopithecus* of the miocene of France was a large anthropoid ape, having large, pointed canine teeth, and resembling in many characteristics the gibbous. The *oreopithecus* of the Italian miocene is a catarrhine, with some dental affinities to the primitive ungulates. In the upper miocene of Greece there has been found the remains of an interesting form resembling both the macaques and semnopithecus, which has been called *mesopithecus pentelici*. The present Asiatic semnopithecus is found in a fossil state in the upper miocene of the Savalik hills of India, in the pliocene of France and Italy, and of the s. of England. The African genus *ceropithecus* has been found in the pliocene of France.

QUADRUPEDS (Lat. four-footed), a term employed both popularly and by scientific writers to designate *four-footed animals*. It is not, however, the name of a class or order in systems of zoology. Popularly, it is almost always limited to those *mammalia* which the *cetacea*, and rarely even to seals or to the *quadrumana* (q.v.). Th full development of have four limbs well developed and formed for walking, and is scarcely ever applied to the limbs, with their termination in *feet* properly so called, thus appears to be by no means one of the most important characters by which groups of animals are distinguished; and this further appears when the same character is found again, in great perfection, in a lower class of vertebrate animals—in chelonian and saurian reptiles. as tortoises and lizards. But the *four-limbed* type prevails among vertebrate animals, from man downward; so that even in serpents, in which it is least notable, traces of it appear on anatomical examination, as in the case of that class of large serpents named boas (see BOA); and there are many other creatures which form connecting links as to this character between serpents and those reptiles—as crocodiles and lizards—which possess it in greatest perfection. The homology of certain fins of fishes with the limbs of quadrupeds is noticed in the article FISHES. No approach to the four-limbed type is to be found among invertebrate animals.

QUAG'GA *Equus*—or *asinus—quagga*, an animal of the family *equidæ* (q.v.), a native of the southern parts of Africa, rather smaller than the zebra (q.v.), with the hinder parts higher and the ears shorter; the head, mane, neck, and shoulders blackish-brown, banded with white; similar bands toward the rump, gradually becoming less distinct; a black line running along the spine. The quagga receives its name from its voice, which somewhat resembles the barking of a dog. It is more easily domesticated than the zebra, and a curricle drawn by quaggas has been seen in Hyde park. In its wild state it does not associate with the zebra, although inhabiting the same plains. Hybrids, or mules, have been produced between the horse and quagga.

QUAHAUG. See VENERIDÆ.

QUAIL, *Coturnix*, a genus of gallinaceous birds of the family *tetraonidæ*, nearly allied to partridges, but having a more slender bill, a shorter tail, longer wings, no spur, and no red space above the eye. The first and second quills of the wing are about as long as the third, which is the longest in the more rounded wing of the partridges. Quails, therefore, far excel partridges in their power of flight. The tail is very short. They never perch on trees, but always alight on the ground. They are among the smallest of gallinaceous birds. The common quail (*C. vulgaris* or *C. dactylisonans*) is found in most parts of Europe, Asia, and Africa. In India and other warm countries it is a permanent resident; but in many countries it is a bird of passage; and thus it visits the north of Europe, and at certain seasons appears in vast multitudes on the coasts and islands of the Mediterranean, so that quails are there taken in hundreds of thousands in their northern and southern migrations. The quail is not plentiful at any season in any part of Britain; but sometimes appears even in the northern parts of Scotland, and more frequently in the south of England, where it is sometimes seen even in winter. There is reason to believe that the food miraculously supplied to the Israelites in the wilderness was this very species of bird, to which the name *selav*, used in the Mosaic narrative, seems to belong.—The quail is fully seven inches in entire length; of a brown color, streaked with different shades, and the wings mottled with light-brown; the throat white, with dark-brown bands in the male, and a black patch beneath the white, the lower parts yellowish-white. The quail is polygamous. The nest is a mere hole in the ground, with 7 to 12 eggs. The quail is highly esteemed for the table. Great numbers of quails are brought from the continent to the London market.—Other species of quail are found in different parts of Asia, although no other is so abundant as the common quail, and none migrates as it does. The Coromandel quail (*C. textilis*) is a very pretty little bird, rather smaller than the common quail. The Chinese quail (*C. excalfactoria*), a very beautiful little species, only about 4 inches long, is abundant in China, and is there kept for fighting, the males being very pugnacious, like those of other polygamous birds, and much money is lost and won on the combats of these quails. It is also used for a singular purpose—the warming of the hands of its owner.

QUAKERS: the ordinary designation of the society of Friends (q.v.). In respect of law, Quakers differ from the rest of their fellow-citizens chiefly as regards their marriages and their taking of oaths. Thus, though the English marriage acts required all marriages to take place in a consecrated church of the establishment, before the dissenters obtained a relaxation of the law, the Quakers' marriages were excepted, and marriages between two Quakers were allowed to be solemnized according to the usages of their own sect. As regards Quakers in the matter of taking oaths, it is expressly provided by several statutes, that instead of taking an oath in the usual way, they may make an affirmation instead, whether as witness in a court of justice, or as holding a civil office, the qualification for which office is the taking of an oath. The penalties of perjury, however, attach to a false affirmation in the same way as to a false oath. With regard to church-rates, it had been decided that Quakers stand on the same footing as other people in respect of their liability to pay church-rates; but compulsory church-rates are now for the most part abolished.

QUAKING-GRASS, *Briza*, a genus of grasses, having a loose panicle; drooping spikelets, generally remarkable for their broad and compressed form, suspended by most delicate foot-stalks, and tremulous in every breath of wind; the spikelets with two glumes and numerous florets, the florets having each two awnless paleæ, which become incorporated with the seed. The species are few, and mostly European. They are all very beautiful. *B. maxima*, a native of the south of Europe, is often planted in flower-gardens. *B. media*, the only species common in Britain, growing in almost all kinds of poor soil, from the sea-coast to an elevation of 1500 feet, is of some value as a pasture-grass, being very nutritious, although the quantity of herbage is scanty. The value of many poor pastures very much depends on it; but when they are enriched by manures, it generally disappears. It is sometimes sown by farmers, but not nearly to such an extent as it would be if its seed did not lose vitality so quickly that only a small proportion grows, if it is not sown in autumn when newly ripened.

QUAMASH, or Biscuit Root, *Camassia esculenta*, a plant of the natural order *liliaceæ*, nearly allied to squills and hyacinths. It is a North American plant, abounding on the great prairies west of the Mississippi. The roasted bulbs are agreeable and nutritious, and are much used as an article of food.

QUANG-NAM, Kuang-Nam, or Turon, a t. of Anam, about 75 m. s.e. by e. from Hué (q.v.), or Phu-thuan-thien, the capital of Anam. It is situated near the head of a beautiful gulf, and is a place of considerable trade.

QUANG-SEE', or Kuang-si, a province of China, its name signifying "western-bound." It lies between 22° and 26° n. lat. and 105° and 112° 30' e. long.; 78,260 sq.m.; pop. about 7,000,000. The province adjoins Quang-tong, Hoo-Nan, and Tonquin. The chief river is the Choo-Kiang, which has many branches and lower down is called the Canton. The surface is very mountainous. The chief products are wheat, rice, and cassia. Gold, silver, and baser metals are found, as are also many gems. Capital Kwei-Lin-Foo.

QUANG-TONG', a province of China, bordering on the China sea and the gulf of Tonquin; 70,018 sq.m.; pop. '48, about 20,000,000. The surface is various, mountainous toward the n. of the province. The soil is generally fertile. The country is watered by the Choo-Kiang or Canton river, and some smaller streams. Rice, sugar, indigo, tobacco, cotton, and silk are produced; the minerals are gold, quicksilver, and marble; among the forest trees are oak and rosewood. There are many manufactures, and the trade is extensive. Capital Canton.

QUANTIFICA'TION of the PREDICATE, a phrase belonging to logic, and introduced by sir W. Hamilton to express the characteristic feature of certain logical doctrines of his respecting the proposition and the syllogism.

According to the Aristotelian logic, propositians are divided, according to their *quality*, into affirmative and negative ("the sun has set," "the sun has *not* set"); and, according to their Quantity, into universal and particular ("*all* men are mortal," "*some* men live eighty years"). If we combine the two divisions, we obtain four kinds of propositions—affirmative universal ("all men are mortal"), affirmative particular ("some men live to eighty"), negative universal ("no men are omnipotent"), negative particular ("some men are not wise").

Now, it is remarked by sir W. Hamilton, that the statement of the Quantity of these various propositions is left incomplete; only the *subject* of each has its quantity expressed (*all* men, *some* men, *no* men); while there is implied or understood in every case a certain quantity of the *predicate*. Thus, "all men are mortal," is not fully stated; the meaning is, that all men are *a part* of mortal things, there being (possibly and probably) other mortal things besides men. Let this meaning be expressed, and we have a complete proposition to this effect: "*all* men are *some* (or part of) mortals," where quantity is assigned, not only to the subject, but also to the predicate. It might be that the predicate contained under it only the subject, as in the proposition: "all matter gravitates." There is no other thing in the universe except matter that obeys the law of gravitation. Knowing this, we might quantify the predicate accordingly: "*all* matter is *all* gravitating things," a kind of proposition not recognized in the old logic. Another original form of proposition, brought out by supplying the quantity of the predicate, is, "*some* A is *all* B;" "*some* men are *all* Englishmen." So that, instead of two kinds of propositions under affirmation, sir W. Hamilton's system gives four. In the same way, he increases the number of negative propositions. 1. For "no man is omnipotent," he writes, quantifying the predicate, "*any* man is not *any* omnipotent;" or, "*all* men are out of *all* omnipotent things." 2. "Some men are not young" is fully quantified; "some men are not *any* young things;" "some men are out of *all* young things." These two (in their unquantified shape) are the ordinarily recognized propositions of the negative class. To them sir W. Hamilton adds: 3. "*All* men are not *some* animals," "all men are excluded from a certain division of the class animal;" and 4. "*Some* animals are not *some* men;" "a portion of the animals is not included in a portion of men."

The first result, therefore, of completing the statement of a proposition by inserting what Hamilton considers as implied in the thought—namely, the quantity of the predicate—is to give eight kinds of propositions instead of four. The next result is to modify the process called the conversion of propositions. See CONVERSE. The kind of conversion called *limitation* (all A is B, *some* B is A) is resolved into simple conversion, or mere transposition of premises without further change. "All A is *some* B;" "some B is all A."

The multiplication of varieties of propositions is attended with the further consequence of greatly increasing the number of *syllogisms*, or forms of deductive reasoning. See SYLLOGISM. In the scholastic logic, as usually expounded, there are nineteen such forms, distributed under four figures (four in the first, four in the second, six in the third, five in the fourth). By ringing the changes on eight sorts of propositions, instead of the old number, four, *thirty-six* valid syllogisms can be formed in the first figure. Whether the increase serves any practical object, is another question.

Sir W. Hamilton also considers that he has been led, by the new system, to a simplification of the fundamental laws of the syllogism, or, as he expresses it, "the reduction of all the *general laws of categorical syllogisms* to a *single canon*."

Professor De Morgan, in his elaborate system of *Formal Logic*, has also invented and carried out into great detail a plan of expressing the quantity of the predicate; but he does not admit the whole of Hamilton's eight propositional forms, rejecting in particular the last-mentioned in the above enumeration. He also increases the number of valid syllogisms as compared with the old logic. Not content with indicating that the predicate has quantity as well as the subject, he supposes the possibility of a *numerical estimate* of quantity in both terms of the proposition, and from this draws a new set of inferences. Thus, if 60 per cent of B are included in C, and 70 per cent in A, 30 per cent at least of B must be found both in A and in C.—See sir W. Hamilton's *Discussions;* Spencer Baynes's *New Analytic of Logical Forms;* De Morgan's *Formal Logic;* Mill's *Logic*, under the syllogism; and his *Examination of Sir W. Hamilton's Philosophy.*

QUAQUAVERSAL (Lat. turning every way), a term applied in geology to the dip of the stratified rocks when arranged in dome-shaped elevations, or basin-shaped depressions, whereby the beds have an inclination on all sides to one point, that point being the summit of the dome in the one case, and the lowest level of the basin in the other.

QUARANTINE (from the Fr. *quarantaine*, a period of 40 days) is a forced abstinence from communication with the shore, which ships are compelled to undergo when they are last from some port or country where certain diseases held to be infectious, as yellow fever, plague, or cholera, are or have been raging. Where a quarantine is established, it is a high misdemeanor for any person in the suspected ship to come on shore, or for any one to disembark any merchandise or goods from her. The countries on the eastern and southern shores of the Mediterranean are those most commonly held to be infectious, and, as a regular arrangement, ships from them have to pass quarantine at Malta, or some French, Italian, or Spanish port. In England, the quarantine laws were, until about 20 years ago, enforced with severity; but now a quarantine is an unusual occurrence, although the power to enact it rests with the crown, and it is occasionally imposed by an order in council. In Mediterranean ports, quarantine ordinarily lasts from 6 to 15 days, though it sometimes extends to a much longer period, during which the passengers are imprisoned in a sort of barrack called a "lazaretto," and the contents of the ship—animals, goods, and letters—are fumigated, punctured, sometimes immersed in water, or even acid, and all possible means are adopted to destroy infection.

Quarantine is not of necessity limited to a sea-frontier; and it is enforced—often with absurd rigor—at the frontiers between contiguous states, especially in eastern Europe, to the annoyance of travelers, and to the serious detriment of commerce.

History declares quarantine regulations for maritime intercourse to have been first established by the Venetians in 1127 A.D.; but the practice must have been greatly older on land frontiers; and the precautions of the Jews against leprosy indicate that a species of quarantine was enforced by them. The law for regulating quarantine, when imposed in England, is 6 Geo. IV. c. 78.

QUA'RÉ IMPEDIT is the title of an English acion, whereby a person who has purchased an advowson, or right of presentation to an ecclesiastical benefice, sues any one who disturbs or hinders him in the exercise of his legal right.

QUARLES, FRANCIS, 1592-1644; b. in Essex, England. His career was an active and varied one, in curious contrast with the recluse character of his verse. He was in Bohemia as part of the retinue of the queen—Elizabeth, daughter of James I.; afterward in Dublin as secretary to archbishop Usher; was driven out of Ireland by the rebellion of 1641, and fled to London, where he was appointed chronologer of the city. Having espoused the cause of Charles I. and defended it in print, he was roughly handled by the Puritan party, and his books and MSS. were confiscated. His death in the same year (1644) is attributed to chagrin at the treatment which he had received. His best-known works are: *A Feast for Worms* (1620); *Argalus and Parthenia* (1621); *Job Militant* (1624); *Enchiridion* (1652); and especially the *Emblems, Divine and Moral* (1635), which has passed through numerous editions, and is still popular.

QUARREL, or QUARRY, a pane of glass of a lozenge or diamond shape. The name is also applied to a perforation or window of this form, and to square or diamond-shaped paving-stones or tiles.

QUARRY (Fr. *carrière*). When any useful rock is worked in an open manner at the surface of the earth, the excavation is called a quarry. Quarrying differs little from mining in principle, except that the latter is essentially an underground operation.

From a very remote period, famous granite quarries have been worked at Syene, and others of sandstone and limestone, along the banks of the Nile, for the temples and monuments of ancient Egypt. Greece found the materials for her white marble temples in the quarries of mount Pentelicus, near Athens, and in those of the islands of the archipelago. It was from the quarries of travertine (a kind of limestone), at Tibur, that ancient Rome was chiefly built. Italy has long been celebrated for her marble quarries, those of Tuscany yielding the most esteemed kinds. The fine saccharoid marbles for statuary and other fine-art purposes are exclusively obtained from the Apuan Alps, which rise around Carrara, Massa, and Seravezza. Those of Carrara, especially, are highly prized all over the world. From the quarries at Seravezza, marble to the value of £150,000 has been taken for the splendid cathedral of St. Isaac at St. Petersburg alone.

Of the more celebrated quarries of the British islands, we may mention those of Cornwall, Aberdeen, and Wicklow for granite; those in the neighborhood of Edinburgh, Glasgow, and Newcastle for sandstone; those near Bristol and Doncaster, and in the isle of Portland, for limestone; those of Derbyshire, Devonshire, Kilkenny, and Galway for marbles; and those of north Wales and Argyleshire for slates.

To understand the operations of the quarryman, it is necessary to bear in mind that all rocks belong to one or other of two great classes, namely, the stratified and the unstratified. The former are sedimentary rocks, occurring in parallel beds or strata, and consist chiefly, in so far as we are at present concerned, of sandstone and limestone. Unstratified or igneous rocks, which include greenstone or whinstone, granite, porphyry, etc., have no distinct bedding, that is, they do not lie in seperate layers. Roofing-slate is a stratified rock, but it splits into thinner laminæ in the direction of its *cleavage* than in the direction of its bedding, the former being often at right angles to the latter. Granite and other igneous rocks have also a natural jointage or cleavage, although they are not stratified. Advantage is taken of these peculiarities in quarrying the different rocks, but in the main the systems adopted do not greatly differ.

Stones are most frequently separated from their native rock by blasting with gunpowder. This operation is described in detail under BLASTING; see also GALVANISM and SAFETY-FUSE. Of late the practice of boring jumper-holes with engine-power has been introduced, and wherever it can be conveniently applied, must be a great improvement on the slow and tedious process of boring by hand. See TUNNEL.

With some stratified rocks, such as sandstone, a good many of the best stones are procured without the aid of gunpowder. Hand-tools are alone used, because blasting is apt to cause rents, and otherwise shatter portions which it is desirable to keep solid. By this method, the quarryman makes a number of small holes with a pick, along a certain length of rock, into which steel wedges are inserted. After a succession of blows with heavy hammers, the wedges at length cut through the stratum. Blocks for columns, obelisks, tombstones, etc., are best procured in this way. It may also be stated that these are obtained from those more valuable parts of sandstone deposits technically termed "liver rock;" which consist of the thicker and more consolidated strata. Flagstones and other pieces of limited thickness are quarried from the thinner beds termed "bed rock."

When stones are removed in masses by blasting or otherwise, they have still to be quarried into shape, according to the purpose for which the various pieces are best suited. Thus, in an ordinary building-stone quarry, the larger stones (after those of unusual size and quality are selected for the purposes named above) are roughly formed into ashlar; window-sills, lintels, rybats, corners, steps, and the like, by means of such tools as picks, hammers of various kinds, and wedges. The small irregular-shaped pieces are called *rubble*, and are used for the commonest kind of building. Slates are split up into the thickness used for roofing, by means of a mallet and broad chisel. In granite quarries worked for paving-stones, as has been incidentally alluded to above, the loss of material in reducing the blocks to the size and shape required, is enormous, as much as four-fifths of the whole being commonly wasted. Besides the tools already mentioned, long iron bars called *pinches*, and powerful cranes for turning and lifting the larger stones, are nearly all the implements required by the quarry-master.

In quarrying, as well as in mining, much of the cost is incurred for the pumping of water from the workings. A good steam-engine and set of pumps are, therefore, indispensable for every quarry of any extent. Much expense is also every now and then incurred in clearing away sand, gravel, and other loose débris from the upper bed of the rock. This, which is called "drift" by geologists, and "tirring" in some localities by quarrymen, often becomes suddenly very deep, especially where the beds dip at a high angle, and is an obstacle by which many quarries of stratified rock are sooner or later arrested.

QUARRIES, in point of law, belong to the person who is owner of the freehold or inheritance of the land, the maxim being that the owner is entitled to the soil down to the center of the earth. No person, therefore, is entitled to work a quarry or carry away the materials unless he derives his right from the owner by lease or other legal title, for the stones or materials are part of the soil, and belong to the freeholder.

QUART, a measure of capacity, and the fourth part of a gallon (q.v.). The word is nothing more than the common word "quarter," a fourth part. The ordinary *quart-bottle* is a deception, containing only the sixth part of a gallon, and often less.

QUARTAN FEVER. See AGUE.

QUARTER, the name of two measures in use throughout the United Kingdom, one of them a measure of weight, and the other of capacity. The former is denominated a quarter from its being the fourth part of a hundredweight, and contains 28 lbs. avoirdupois; the capacity measure of the same name is said by some to have been so called from its being the fourth part of a "chaldron," but, as it happens, the quarter does not always bear this relation to the chaldron. As the porphyry coffer in the king's chamber of the great pyramid (see PYRAMID) is said to be almost accurately the quadruple of the English quarter, the bold theory has been advanced that this is the origin of the measure and the name (see *Our Inheritance in the Great Pyramid,* by Piazzi Smyth). The quarter contains 8 bushels, of 4 pecks each. See BUSHEL.

QUARTER, in heraldry, a subordinary consisting of the upper dexter fourth part of the shield, cut off by a vertical and a horizontal line meeting in the center of the shield. When two or more coats are marshaled together on a shield divided into squares for their reception, such divisions are also called quarters. See QUARTERING.

QUARTER, in war, signifies the sparing of the life of a vanquished enemy, which by the laws of war is forfeit to the victor. The expression seems to be derived from the use of the word "quarter" to designate the lodging of a particular warrior; to *give quarter* to a prisoner being to send him to his captor's quarter for liberation, ransom, or slavery. The refusal of quarter is a terrible aggravation of the horrors of war, and is only at all justifiable toward an enemy who has been guilty of atrocious cruelty himself or of some flagrant breach of faith.

On shipboard, a quarter is the stern portion of each of the ship's sides. The extent of the quarter is arbitrary, but it is generally held to comprise about one-fifth of the ship's length.

QUARTER-DAYS are the days adopted between landlord and tenant for entering or quitting lands or houses and for paying rent. The origin of these periods is no doubt due entirely to convenience, and though in England they are unknown to the common law, yet now they are almost part and parcel of every agreement made between parties as to the letting of houses and land. In England, if nothing is said as to the time of payment of rent, it is due only once a year, and the first payment is due at the end of a year from the time of entry. But, owing to the convenience of the usual quarter-days, they are commonly referred to, and thereby imported into the contract. Thus, it is usual to enter and leave houses either at one of the four ordinary quarter-days, or where it is so arranged at half-quarter-days, and these points of time are fixed upon for the convenience of calculating rent. Rent of houses is generally made payable quarterly on the usual quarter-days. These are, in England and Ireland, Lady day, Mar. 25; Midsummer day, June 24; Michaelmas day, Sept. 29; and Christmas day, Dec. 25. In Scotland, there are what are called two legal terms in each year, and two conventional terms, the latter being only adopted when expressly so agreed. The legal terms are Whitsunday, May 15, and Martinmas, Nov. 11; and the conventional terms are Candlemas, Feb. 2, and Lammas, Aug. 1. The law of Scotland differs from that of England in this, that if nothing is said between the parties on letting houses and lands, these legal terms are impliedly included as part of the agreement, both as regards time of entry and payment of rent. Thus, as to houses and grass-lands, the legal term of the entry is Whitsunday, and that of entry to arable land is Martinmas. So the rent is presumed to be payable twice a year at those legal terms, if nothing is said to the contrary.

QUARTER-DECK of a ship is an upper deck extending from the main-mast to the poop, or, when there is no poop, from the main-mast to the stern. It is used as a promenade by the officers only, and, in a ship-of-war, no person—officer or otherwise—enters upon it without touching his hat in token of salute. When the capt. addresses his men, or confers public distinction on any individual, the crew are summoned aft on the quarter-deck.

QUAR'TERING, in heraldry, is the bearing of two or more coats on a shield divided by horizontal and perpendicular lines, a practice not to be found in the earlier heraldry, and little in use till the 15th century. Arms may be quartered for various reasons. 1. To indicate dominion. A sovereign quarters the ensigns of his different states. The earliest instance of quartering in England is found in the paternal arms of Eleanor, daughter of Frederick III., king of Castile and Leon, and first wife of Edward I., as represented on her tomb in Westminster Abbey—the castle of Castile occupying the first and fourth quarters, and the lion of Leon the second and third. The arms of England and Ponthieu are similarly quartered on the same monument, and on the crosses erected to queen Eleanor's memory. The received rule regarding the quartering of the ensigns of different states is, that precedence is given to the most ancient, unless it be inferior in importance. Feudal arms are sometimes quartered in the same way by subjects. 2. Arms of augmentation or special concession accorded to a subject by his sovereign, by way of honor, are sometimes granted to be borne quarterly with the paternal arms. These generally contain a portion of the royal insignia, and have precedence of the paternal coat. 3. The most usual reason for quartering is to indicate descent from an heiress who has intermarried into the family. Where there is but one heiress, her coat occupies the second and third quarter of the shield, and the paternal arms the first and fourth. Where there are more than one, they are marshaled in the successive quarters in the order of the intermarriages. Where more than four coats have to be marshaled, the number of vertical lines is increased, and the divisions, though more than four, are still called quarters. Where there is an odd number of coats, the last quarter is usually filled up by repeating the first. One of the quarters may itself be quartered, when the heiress was entitled to bear a quartered coat; the shield is then said to be counter-quartered, and its primary quarters are called *grand quarters*. Quarterings are not allowed to be added to the paternal coat without the sanction of the heraldic authorities.

The expression "quarterings" is often loosely used for *descents* in cases where there is no right to quarter from representation. The eight or sixteen quarterings which are sometimes ranged round the Scottish funeral escutcheon, and which are still important for many purposes in Germany, have no reference to representation, but imply purity of blood for four or five generations; i.e., that the father and mother, the two grandmothers, and four great-grandmothers, as also in the case of sixteen quarterings, the eight great-great-grandmothers, have all been entitled to coat-armor.

QUAR'TERMASTER. In the army, the *quartermaster-general* is a staff officer of high rank, whose duty it is to arrange the marches, quarters, and internal arrangements of the army to which he belongs. Every army has some officer of this department; from a brigade with a deputy-assistant-quartermaster-general, receiving £173 7s. 6d. a year besides regimental pay, up to a complete army under a commander-in-chief, with a quartermaster-general, who is usually a general officer, and receives £691 19s. 7d. per annum, besides his other pay. At headquarters there is a permanent quartermaster-general, responsible for all the movements of the army, the organization of expeditions, camps of instruction, etc. He receives £1500, besides his pay as a general officer, and has a sub-department at the war-office, with clerks, etc. He is under the officer commanding in chief, and the adjutant-general. The *quartermaster* is an officer on the staff of each regiment, in which he holds the relative rank of lieut. His duties are to superintend, assign to their respective occupants, and have charge of, quarters, barracks, tents, clothing, etc., used by the regiment. He is also regimental storekeeper. He rises, with scarcely an exception, from the ranks, the experience of an old sergeant being considered highly useful in the office. The quartermaster has no further promotion to look forward to; but after 30 years' service in all—including 10 as an officer—he may retire with the honorary rank of capt. He receives 10s. 2d. a day in the cavalry, and 8s. 2d. in the infantry, rising by length of service to 15s. 2d. and 13s. 2d.; with slightly different rates in the guards, engineers, etc. He is not required to join the mess. The *quartermaster-sergeant* is a non-commissioned officer appointed to assist the quartermaster in his various duties. He receives daily 4s. 5d. in the cavalry, 4s. in the artillery, 2s. 11d. in the infantry of the line.

In the navy, the *quartermasters* are certain petty officers appointed in each ship by the capt. to have charge of the stowage of ballast and provisions, of coiling ropes, attending to the steering, keeping time by the sand-glasses, etc. The principal of these men is called the ship's quartermaster, and receives £41 1s. 3d. per annum, if engaged for continuous service; £36 10s. if otherwise.

QUARTERMASTER (*ante*), in the U. S. army, is a regimental officer with rank of lieut., assisted by a quartermaster-sergeant. The organization of the quartermaster's department of the regular army now includes a quartermaster-gen. with rank of brig.-gen.; 4 assistant quartermaster-gens. with rank of col.; 8 deputy-quartermaster-gens. with rank of lieut.col.; 14 quartermasters with rank of maj.; and 30 assistant-quartermasters with rank of capt. The general duties of the department are to furnish food, forage, ammunition, clothes, and fuel; to purchase horses, wagons, tents, ambulances, and equipage; to provide transportation; and to see that railroads, telegraphs, bridges, and roads are in order.

QUAR'TERN is a term frequently employed in some parts of Great Britain to designate the fourth part of a peck; and in liquid measure, it is the fourth part of a pint, and is synonymous with the imperial gill.

QUATER'NARY, a term employed by some French and English geologists to characterize the post-tertiary strata, which they group together into an epoch of equal value with the three great divisions of primary, secondary, and tertiary. The deposits included under the name will be found described under the pleistocene and recent strata, to which we refer the reader.

QUATER'NIONS, the name given by its inventor, sir W. R. Hamilton (q.v.), to one of the most remarkable of the mathematical methods or calculi, which have so enormously extended the range of analysis, while simplifying its application to the most formidable problems in geometry and physics.

It would be inconsistent with our plan to give even a complete though elementary analytical view of this calculus; but it is possible, by means of elementary geometry and algebra alone, to give the reader a notion of its nature and value.

For this purpose, it will be necessary to consider some very simple, but important, ideas with reference to the *relative position* of points in space. Suppose A and B to be any two stations, one, for instance, at the top of a mountain, the other at the bottom of a coal-pit. *Upon how many distinct numbers does their relative position depend?* This can be easily answered, thus: B is so many degrees of longitude to the e. or w. of A, so many degrees of latitude to the n. or s. of A, and so many ft. above or below the level of A. THREE numbers suffice, according to this mode of viewing the question, to determine the position of B when that of A is given. Looking at it from another point of view, suppose A to be the earth, B a fixed star. To point a telescope at B, we require to know its altitude and azimuth, its latitude and longitude, or its right ascension and declination. Any of these pairs of numbers will give us the *direction* of the line AB, but to determine absolutely the position of B, we require a *third* number—viz., the length of AB. Hence, it appears that any given line AB, of definite length and direction, is completely determined by *three* numbers. Also, if the line *ab* be parallel and equal to AB, it evidently depends on the same three numbers. Hence, if we take the expression (AB) to denote (*not*, as in geometry, the length of AB merely, but) the length and direction of AB; we see that there will be no error introduced, if we use it in the following sense:

$$A + (AB) = B;$$

i.e., if, beginning with A, we take the step represented by (AB), we shall find ourselves at B. From this it follows at once that, if C be any third point,

$$A + (AB) + (BC) = C;$$

i.e., beginning at A, and taking the successive steps(AB)and (BC), we are finally brought to C. But we have also

$$A + (AC) = C,$$

by taking the step from A to C at once. Hence, with the present signification of (AB), etc., we see that

$$(AB) + (BC) = (AC),$$

which shows that lines, *when their length and direction are both considered,* are to be added or compounded according to the same law as velocities or forces. See COMPOSITION OF FORCES. In this sense, a line is called by sir W. R. Hamilton a *vector.*

Again, we have evidently

$$A + (AB) + (BC) + (CA) = A,$$

because the three successive steps bring us back to the starting-point. Hence

$$(AB) + (BC) = -(CA),$$

and therefore (AC) = − (CA), or the sign (only) of a vector is changed if its direction be reversed.

The rules for the addition, and, therefore, for the subtraction, of vectors are thus extremely simple; and, without any further preface, we are in a position to solve a great many geometrical problems, some of which are of no common difficulty. A comparatively simple one must suffice; let us prove Euclid i. 33; i.e., if AB be parallel and equal to CD, AC is parallel and equal to BD. In vectors, given (AB) = (CD), prove (AC) = (BD). We have at once, by going directly from A to C, and then by the course A, B, D, C,

$$(AC) = (AB) + (BD) + (DC).$$

But (AB) = (CD) = − (DC) by what we have just proved. Hence the first and third terms of the expression for (AC) are equal and of opposite signs, and therefore

$$(AC) = (BD).$$

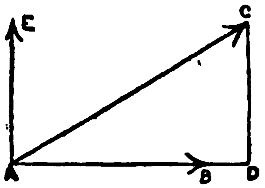
This example has been chosen from its simplicity, and gives an extremely inadequate idea of the grasp which vectors take in common geometry.

So far, we have not advanced much beyond common geometrical methods; but we *now* come to the step in which quaternions proper are introduced, a vector being merely a degraded species of quaternion. This new step contains Hamilton's answer to the question, answered over and over again during the last 50 years in forms of the most uncouth complexity, "*How to express the product, or the quotient, of two vectors, or directed lines.*" In other words, keeping to one part of the question only, what is the nature of the factor q in the equation

$$(AC) = q(AB),$$

where A, B, C are any three points?

Let us first consider *on how many independent numbers does it depend?* It might at first sight appear to depend on *six*, for (AB) and (AC), as we have already seen, each contain *three*. But let us analyze the process of passing from the one vector to the other, much as we have already analyzed the vector step of passing from one point to another. To simplify the idea of the process, let us suppose it to be effected by a species of rotation. First, then, in order that (AB) may be turned so as to coincide in *direction* with (AC), it must be turned about an axis perpendicular to the plane of the triangle ABC, and through an angle BAC. Now, the *direction* of a line depends on *two* numbers, as we have seen above; hence, we have *two* for the direction of the axis, and *one* for the angle through which AB is turned. But AB and AC are not, in general, of equal length; hence, after their directions have by turning been made coincident, AB must be compressed or stretched till its *length* is the same as that of AC. Thus, a *fourth* number is required for the complete description of the process, and, therefore, q depends upon *four independent numerical quantities;* hence its name, quaternion. A similar investigation, but somewhat less elementary, shows that the *product* of two vectors also depends on four distinct numbers. This will be proved analytically further on in the article.



Now, suppose AB and AC to be *equal* to each other, and at right angles; and suppose

$$q(AB) = (AC);$$

i.e., suppose that q turns AB through a right angle in a given plane, without altering its length. Apply the operation denoted by q, a second time, and we have

$$q \,.\, q \,.\, (AB) = q(AC).$$

Now $q(AC)$ must represent a vector equal to AC in length, but turned through a right angle, in the plane BAC. It must therefore be in the direction of BA produced through A, and equal in length to AB. Hence, by a previous remark, it may be expressed by

$$-\ (AB), \text{ or by } (BA).$$

Hence, $q \,.\, q(AB) = -\ (AB)$, or $q \,.\, q = -\ 1$.

The particular quaternion, therefore, which turns a vector through 90° without altering its length, has its square equal to — 1. Though, of course, they are essentially a real geometrical conception, this result shows how closely quaternions are connected with what are called imaginary quantities (q.v.) in analytical geometry and algebra.

Now, it is found, by a careful examination of all the consequences involved, that we are at liberty to represent by a vector of unit length, perpendicular to the plane of two equal lines at right angles to each other, the quaternion which, employed as a multiplier, changes one of these lines into the other. This result we must assume; as its proof, though not in any sense difficult, would require the free use of analytical symbols to condense it within our assigned limits. Hence, three vectors, each of unit length, and each perpendicular to the other two, have the property that the product of any two, taken in the proper order, is the third. For illustration, suppose these to be drawn eastward, northward, and upward, and let them be represented (according to Hamilton's notation) by i, j, k, respectively; we have the following equations among them:

$$i \,.\, j = k,\ j \,.\, k = i,\ k \,.\, i = j;$$

where it is to be observed that the *order* of the alphabet is maintained throughout. Also, as before, we see that $i^2 = j^2 = k^2 = -\ 1$.

Considering them for a moment as handles to be laid hold of to turn the whole system about one of them, we see that i turns j into the position of k; that is, the operation i may be effected by a lefthanded quadrantal rotation about the eastward line i. What, then, is the result upon the vector i of the rotation symbolized by j? Laying hold of the northward line j, use it as an axis of left-handed quadrantal rotation, and the effect on the system will be not only (as above, $jk = i$) to make the upward line an eastward one, but to make the eastward line a *downward* one; in symbols,

$$j \,.\, i = -\ k.$$

Comparing this with

$$i \,.\, j = k,$$

we see that in quaternions, *the commutative law of multiplication does not hold;* i.e., that the product depends not only on the factors, as in arithmetic and algebra, but upon the *order* in which the multiplication is effected. This is, of course, a little perplexing to the beginner, but is easily got over; and the mere consideration of this fact is often sufficient for the proof of theorems regarded in general as of no ordinary difficulty.

For further information, we must refer the reader to sir W. R. Hamilton's *Lectures on Quaternions*, and to his *Elements of Quaternions*. Some elementary information may also be derived from papers by Kelland and Tait in the *Quarterly Messenger of Mathematics*, and the *Quarterly Mathematical Journal*. The subject is yet in its infancy, but even now its power is herculean, and its extreme simplicity and generality recommend it to all who are desirous of extending the effective range of mathematical analysis.

QUARTERS, in naval and military affairs, are generally the positions assigned to persons or bodies of men. In a more special sense, the quarters in the army are the places of lodging assigned to officers or men, when not actually on duty. *Headquarters* is the quarter of the commanding officer of a force, or of a section of a force. The headquarters of the whole British army is at the horse-guards, where the commander-in-chief has his permanent offices.

In the *navy*, quarters has the special meaning of the positions to be taken by every man in actual combat.

QUARTERS, the upright posts of timber-partitions, etc., used for lathing upon. They do not exceed 4 in. square, and are generally about 4½ in. by 2 in., and are placed from 12 to 14 in. apart.

QUARTER-SESSIONS, in England, is a court or meeting of justices of the peace, who assemble every quarter of the year, for judicial as well as miscellaneous business. The meetings are fixed by statute to be held in the first full week after Dec. 28, Mar. 31, June 24, and Oct. 11, respectively; often otherwise called the Epiphany, Easter, Trinity, and Michaelmas sessions. The chief officer of the court of quarter-sessions is the *custos rotulorum*, so called because he is intrusted with the custody of the records and rolls. He is always one of the justices of the peace of the county or riding, nominated by the crown, and appointed by the commission. His deputy is the clerk of the peace, who acts also as clerk to the court of quarter-sessions. The jurisdiction of the court of quarter-sessions is confined to criminal business, and is very important. It includes all criminal offenses whatever, except the highest classes; thus, it has no jurisdiction to try for treason, murder, or capital felony, or blasphemy, perjury, forgery, arson, bigamy, abduction of women or girls, concealment of birth, offenses against the queen's title or the bankrupt laws, bribery, blasphemous, seditious, or defamatory libels, unlawful combinations or conspiracies, stealing or destroying wills or records. Besides its jurisdiction in criminal offenses, there are numerous miscellaneous matters of which the court has cognizance, including appeals from petty sessions, and from justices in special sessions, on a great variety of subjects as to convictions of vagrants, stopping up highways, removal of paupers, etc. The justices who do the work of quarter-sessions are all unpaid, and thus save the country much expense. They generally choose a chairman of their own body to preside regularly at these courts, which office is considered a great honor, and is generally given to an able practical man, well versed in business.

This plan, however, of unpaid judges has been found inexpedient in boroughs and large towns, where the justices of the peace being appointed chiefly from successful tradesmen, are not possessed of the necessary education to secure the efficient performance of like duties. There is therefore appointed for every borough in England a recorder, who is a barrister, appointed by the home secretary, and is paid by salary out of the borough fund—a salary, however, very trifling in amount. His duty is confined to trying prisoners and other judicial business, and he is in fact, in his own person, the court of quarter-sessions for boroughs. There is also an exception to unpaid judges of quarter sessions in the county of Middlesex, where a barrister is appointed to act in the trial of prisoners, and called the assistant judge, being the official chairman of the Middlesex sessions. The routine of business at quarter-sessions consists of the trial of offenders, the trial of appeals, and the hearing of motions upon different subjects. Sometimes a second court sits, consisting of some of the justices appointed by the whole court, whenever the business is unusually heavy. In Scotland there is also a court of quarter-sessions of the peace, held four times a year at the county town—viz., on the first Tuesdays in May, August, and March, and the last Tuesday in October. At these courts, the justices have power to review the sentences of special and petty sessions. But these courts are of a trifling description compared to the courts of the same name in England. In Scotland, the judicial business which in England devolves on courts of quarter-sessions, is chiefly disposed of by the sheriff of the county.

QUARTER-STAFF, formerly a favorite weapon with the English for hand-to-hand encounters, was a stout pole of heavy wood, about 6½ ft. long, shod with iron at both ends. It was grasped in the middle by one hand, and the attack was made by giving it a rapid circular motion, which brought the loaded ends on the adversary at unexpected points.

QUAR'TET, a piece of music arranged for four voices or instruments, in which all the parts are *obligati*, i.e., no one can be omitted without injuring the proper effect of the composition. Vocal quartets are generally accompanied by instruments to sustain the voices. A mere interchange of melody, by which the parts become in turn principal and subordinate, without any interweaving of them, does not constitute a quartet. Quartets for stringed instruments are generally arranged for two violins, a tenor violin, and violoncello. The important quartets have been composed by Haydn, Mozart, Beethoven, Spohr, and Onslow.

QUAR'TILE. See ASPECTS.

QUARTO-DE'CIMANS, those who, after the final decision of the council of Nicæa, continued to hold that it was obligatory on Christians to celebrate Easter on the 14th day of the first lunar month near the vernal equinox, *whether that 14th day fell on Sunday or not*, or who, even before the council of Nicæa, held the observance of the Jewish Passover to be of obligation. The controversies as to the celebration of Easter have been briefly described under the head Easter (q.v.).

QUARTZ, a mineral, which is essentially *silicic acid*, or *oxide of silicon* (see SILICON), although it is often combined or mixed with other substances. It is a very abundant and widely diffused mineral. It is almost the sole constituent of quartz rock, in which gold is far more frequently found than in any other matrix; and it is a principal constituent of granite, syenite, protogine, eurite, pegmatite, granulite, elvanite, all the different kinds of sandstone, and many other rocks. It is also a common mineral in trap-rocks, limestone, etc., and the sands of the sea-shore and of deserts are chiefly formed of it. It is found both massive and crystallized; the primary form of the crystals is a rhomboid, but it far more frequently occurs in six-sided prisms, terminated by six-sided pyramids; or in six-sided pyramids; or sometimes in dodecahedrons, formed by six-sided pyramids base to base. It is hard enough to scratch glass easily, and it gives fire with steel. It becomes positively electrical by friction; and two pieces, rubbed together, give light in the dark. When pure it is quite colorless; but, owing to the presence of foreign substances, it often exhibits great variety of colors; and many minerals, known by different names, and consisting chiefly of quartz, have little or nothing to distinguish them but their color. Thus rock crystal, chalcedony, carnelian, cairngorm, agate, amethyst, prase, chrysoprase, jasper, etc., are mere varieties of quartz. Opal (q.v.) is very nearly allied to it.

Quartz rock, or quartzite, is a sedimentary sandstone, converted into a very hard compact rock by metamorphic action. It is distinctly granular; the grains, however, seem to melt into each other, or to be enveloped in a homogeneous silicious paste. It is frequently brittle, and in weathering, it breaks up into small irregular cubes.

Quartz veins occur in metamorphic rocks. The structure of the veins is compact and homogeneous, and very different from that of quartzite. Veins not only differ in width, but the same vein is very variable throughout its course, sometimes thinning to a very fine film, and then swelling out to great thicknesses, Quartz veins are more metalliferous than the mass of the rocks in which they occur. They are the principal natural repositories of gold, for though the precious metal is chiefly obtained from alluvial sands and gravels, these are the weathered and abraded fragments of the under-lying, or neighboring palæozoic rocks. Small quantities of gold have been found in the quartz veins traversing the Silurian and Cambrian rocks of Wales and Scotland; and in Victoria the great veins are so highly auriferous, that they are mined for the precious metal. Wherever the lower Silurian rocks make their appearance on the surface throughout the colony, they are everywhere intersected by enormous numbers of quartz veins, which often reach a thickness of 10 to 15 feet. As yet only a very small proportion of these have been explored; but the results have been so remunerative, that mining in the solid rock for gold is extensively pursued. One mine has been driven to a depth of 400 ft., and, contrary to the generally-received opinion, the vein at this depth continued to be auriferous.

QUASIMODO SUNDAY, called also DOMINICA IN ALBIS the first Sunday after Easter. The name Quasimodo Sunday is taken from the first words of the Introit (1 Peter ii. 2) of the mass of the day. The name *Dominica in Albis* is derived from the custom which was formerly observed of the neophytes who had been baptized at Easter appearing in white garments in the church.

QUASS, a sort of weak beer produced in Russia by fermenting rye-meal in warm water. It is usually bottled in stone bottles, and is a favorite beverage with the people generally. When it becomes too sour it is used as vinegar.

QUAS'SIA, a genus of trees and shrubs of the natural order *simarubaceæ* (q.v.); having hermaphrodite flowers, with five petals combined into a tube, and much longer than the small calyx, ten stamens, five germens, and only one style; the fruit composed of five drupes. *Quassia amara* is a native of the tropical parts of America, and of some of the West India islands. It is a shrub of 10 to 15 ft. high, with racemes of bright-red flowers, and large pinnate leaves, the stalks of which are remarkably winged and jointed. The wood, and particularly that of the root, has a very strong, bitter taste, and was at one time much used in medicine under the names of *quassia-wood, bitterwood*, etc. The flowers were valued in Surinam for their stomachic properties, as early as the beginning of the 18th c.; the wood of the root began to be known in Europe before the middle of that century, and was more fully brought into notice about 1756, by Rolander, a Swede, who had visited Surinam, and had learned its value from a negro called Quassi, or Quasha. This negro had employed it with great success as a remedy for fevers, and although, as Rolander says, a very simple man, had acquired a great reputation by his use of it. Linnæus published a dissertation on it in 1768, and it was he who gave to the genus the name quassia, from the name of the slave by whom its medicinal qualities had been made known. The true quassia is now, however, little used; its name having been transferred to the bitterwood (q.v.) of the West Indies, *picærna* (or *simaruba*) *excelsa*, a lofty tree, the wood of which possesses the same properties, although in an inferior degree; but this inferiority is compensated by the greater facility with which any requisite supply is obtained. It is the wood of this tree which is now sold as *quassia-wood*, or *quassia-chips*, in the shops. It is used to a considerable extent instead of hops for making beer, although the use of it is illegal in Britain, and beer made with it is said to become muddy and flat, and not to keep. Quassia-wood is narcotic, and a decoction of it is used for killing flies. Cabinet-work made of it is safe from all attacks of insects. In medicine, it is a valuable tonic; but in fevers, it is not to be compared with Peruvian bark and its alkaloids. Its properties depend chiefly on a bitter principle called *quassite* or *quassin*.

QUA'TRAIN (Fr. *quatre*, four) is the name given (originally by the French) to a little poem of four verses (lines) rhyming alternately, or even sometimes to four verses of a longer poem, such as a sonnet, if they form a complete idea within themselves. Epigrams, epitaphs, proverbs, etc., are often expressed in quatrains.

QUATRE-BRAS (Four Arms), a village of Belgium, province of S. Brabant, about 10 m. s.s.e. of Waterloo. It is situated at the intersection of the great roads from Brussels to Charleroi, and from Nivelles to Namur, whence its name. On June 16, 1815—two days before the battle of Waterloo, Quatre-Bras was the scene of a desperate and sanguinary battle between the English under Wellington and the French under Ney. The honors of the field remained with the former; but the severe defeat of Blücher the same day at Ligny rendered Wellington's hard-won victory almost valueless; and foreseeing that it would be impossible for him to maintain his position, the English commander retired next morning through Jemappes to Waterloo, in order to keep up his communication with the Prussian army. The loss of the English and their allies at Quatre-Bras was in all 5,200; that of the French, though beaten, amounted only to 4,140. This is to be accounted for by the fact that, during the greater part of the engagement, the English had no cavalry (for the Belgian horse galloped off the field without striking a blow) and no artillery.

QUATREFAGES DE BRÉAU, Jean Louis Armand de, b. France, 1810; received a medical education at Strasbourg, and devoted himself especially to scientific studies. In 1829 he published an essay entitled *Théorie d'un Coup de Canon*; in 1830 a work *Sur les Aérolithes*; in 1832 a book *De l'Extraversion de la Vessie*; meanwhile acting as assistant professor in the university of Strasbourg; afterward engaged in the practice of medicine at Toulouse, and was a contributor to scientific periodicals. In 1850 he became professor of natural history in the Lycée Napoleon in Paris; in 1852 member of the academy of sciences; in 1855 was called to the chair of anthropology and ethnology in the museum of natural history, and in 1879 became a member of the royal geographical and acclimation societies of London. Among his other publications are *Etudes sur les Types inférieurs de l'Embranchement des Anneles; Physiologie comparée, Metamorphose de l'Homme et des Animaux*, 1862; *Les Polynésiens et leur Migrations*, 1866; *Charles Darwin et ses Précurseurs Français; La Race Prussienne*, 1871; and *L'Espèce humaine*, 1877.

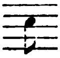
QUATREFOIL, an opening in tracery, a panel, etc., divided by cusps or featherings into four leaves. This form is much used as an ornament in Gothic architecture.

QUATREFOIL, a heraldic bearing meant to represent a flower with four leaves. It is not represented with a stalk unless blazoned as *slipped*, in which case the stalk joins the lower leaf.

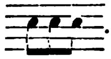
QUATREMÈRE, Etienne Marc, a learned French orientalist, was b. in Paris, July 12, 1782, and from his earliest childhood to his latest years was literally immersed in abstruse studies, and lived more after the fashion of a medieval recluse than a modern scholar. His public life was almost eventless. Employed in 1807 in the manuscript department of the *Bibliothèque Impériale*, he was promoted in 1809 to the Greek chair in the college of Rouen, and in 1819 to the chair of ancient oriental languages in the collége de France. In 1827 he became professor of Persian in the school for modern oriental languages. He died Sept. 18, 1857. Quatremère's erudition was something enormous, as might have been expected from his uninterrupted life-long devotion to study, but according to M. Ernest Renan (himself one of the first living orientalists), he was strikingly deficient in critical insight, and a genius for sagacious and luminous generalization. He would never believe in the hieroglyphic discoveries of Champollion; he despised comparative philology, and thought the labors of men like F. Schlegel, Bopp, Burnouf, etc., were wasted. But in less delicate fields of exploration he is safe. His historical and geographical memoirs, for example, are of incalculable value. Quatremére's principal works are—*Recherches sur la Langue et la Littérature de l'Egypte* (Par. 1808), in which it is shown, in the clearest manner, that the language of ancient Egypt is to be sought for in the modern Coptic; *Mémoires Géographiques et Historiques sur l'Egypte* (Par. 1810); *Histoire des Sultans Mameloucks* (Par. 1837), from the Arabic of Makrizi; *Histoire des Mongols de la Perse* (Par. 1836), from the Persian of Rashid-Eddin; and his edition of the Arabic text of the Prolegomena of Ibn-Khaldun, one of the most curious monuments of Arabic literature. Besides these, a multitude of most valuable articles are scattered through the pages of the *Journal Asiatique* and the *Journal des Savants.* It is deeply to be regretted that circumstances interfered to prevent his executing certain great lexicographical works—Arabic, Coptic, Syriac, Turkish, Persian, and Armenian dictionaries—which he had planned, and for which he had gathered ample materials. His old master, Silvestre de Sacy, pronounced him "the only man capable of making an Arabic dictionary."

QUATREMÈRE DE QUINCY, ANTOINE CHRYSOSTOME, 1755–1849; b. France; author of an *Essay on Egyptian Architecture,* and the *Dictionary of Architecture,* published in three quarto volumes; a participant in the French revolution; in 1815 superintendent of public monuments, and secretary of the academy of fine arts from 1816 to 1839. He also was the author of *Le Jupiter Olympien,* 1814; *De l'Imitation dans les Beaux Arts,* 1823; and lives of Michael Angelo, Raphael, and Canova.

QUA'VER, in music, a note whose measure is equal to half a crotchet, one-fourth of a minim, or one-eighth of a semibreve. It is represented thus:



; or when two or more are conjoined, thus:



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QUAY (Fr. *quai*), an artificial landing-place or wharf, consists usually of a platform on piles, or of masonry, surmounted with cranes, tramways, and other appliances for lading and discharging cargoes from shipping.

QUEBEC', the most important military position in the dominion of Canada, is situated on a steep promontory at the junction of the river St. Lawrence and St. Charles, in lat. 46° 48′ n., long. 71° 12′ west. It is distant from Liverpool about 2,070 m., is 180 m. n.e. of Montreal, 503 m. e.n.e. of Toronto, and 578 m. n.n.e. of New York. It is connected with all the cities in America by means of the Grand Trunk railway. The site of Quebec originally occupied by an Indian village named Stadacona, was discovered by Jacques Cartier in 1535; but the city was founded by Champlain in 1608. It continued to be the center of French trade and civilization, as well as of Roman Catholic missions in North America, till 1759, when it fell into the hands of Britain by the memorable victory of Wolfe on the heights of Abraham above the city. Quebec remained the chief city of Canada till the British settlements in the west were erected into a separate province, when it became the capital of Canada East, now forming the province of Quebec in the dominion of Canada. The citadel of Quebec is the most impregnable fortress on the continent of America. The view which it commands is one of the most magnificent in the world, and the scenery in its neighborhood, amid which are the falls of Montmorenci, imparts an additional attraction to the city. A seminary for the education of Roman Catholic clergymen was established in the city in 1636 by M. de Laval de Montmorenci, and was raised by the queen in 1854 into a university bearing Laval's name. A Presbyterian college, named after its founder, Dr. Morrin, was instituted in 1862, and affiliated in the following year to the M'Gill university of Montreal. Quebec is the seat of a Roman Catholic archbishop, and an Anglican bishop, whose respective cathedrals are among the finest specimens of Canadian church architecture. The church of Scotland and the principal denominations of dissenters are also represented in the city. From the building-yards of Quebec there are annually launched between 30 and 40 vessels of various tonnage. From 1400 to 2,000 vessels enter the port every year from the ocean, principally to export the produce of the country. The chief export trade is in timber. The principal imports are woolen, cotton, and silk goods; iron, coal, hardware, and salt. The exports amount to upward of £2,500,000 annually; the imports to about £1,500,000. Quebec has weekly communication by steam-packet with Liverpool and Glasgow, and fortnightly with London. The population in '71 was 59,699, a slight decrease from 1861, owing to the withdrawal of the garrison. The city returns three members to the dominion parliament and three to the provincial legislature.

QUEBEC (*ante*), a province of the dominion of Canada, formerly Canada East. It is situated between lat. 45° and 53° 30′ n., and long. 57° 8′ and 79° 30′ w., and is bounded on the n. by Labrador and Hudson's bay; on the e. by Labrador and the gulf of St. Lawrence; on the s. by the bay of Chaleurs, New Brunswick, Maine, New Hampshire, Vermont, and New York; and on the s.w. by the Ottawa river and the province of Ontario. The area is about 193,355 sq.miles. South of the St. Lawrence river, which runs through the entire length of the province, the land is hilly, and n. of that river most of the country also is rocky and mountainous. The Notre Dame mountains, a continuation of the Green mountains in Vermont, extend e. from the latitude of the city of Quebec along the course of the St. Lawrence on its s. side to the gulf of the same name, attaining here and there a height of 3,000 or 4,000 feet. The Laurentian mountains, on the n. of the St. Lawrence, extend from the Labrador coast to the Ottawa river above Ottawa. This range also attains a height in some places of 4,000 ft. above the sea. Along the gulf of

St. Lawrence the province has a coast line of 1164 miles. The principal bays are Gaspé and Chaleurs. The St. Lawrence is the chief river and the great avenue of commerce. Its largest tributaries in the s. are the Chateauguay, which rises in New York and is navigable a considerable distance; the Richelieu, or St. John's, 80 m. long, the outlet of lake Champlain; the Yamaska, 90 m. long; the St. Francis, 100 m. long, which receives the Magog, the outlet of lake Memphremagog, and empties into the St. Lawrence at lake St. Peter; the Nicolet, Bécancour, Chaudière, Rimouski, and Matane. In the n. the largest tributaries from the St. Lawrence lying wholly within the province are the Saguenay and the St. Maurice rivers. Besides these rivers there are others branching out here and there as tributaries of the Ottawa, the longest of which are the Keepawa, 120 m.; the Gatineau, 400 m.; the Du Lièvre, 260 m.; and the Rivière du Nord, 160 miles. The lakes of the province are numerous, especially in the n.w. part. The largest is lake St. John, 30 by 25 m. in extent, about 120 m. n. of the city of Quebec. The great northern hill region is scarcely habitable except in low fertile valleys, but it affords immense supplies of timber. Between the ranges of mountains on the s. and n. of the St. Lawrence, however, the country is a succession of fertile, prosperous valleys, and hills densely timbered, containing deposits of copper ores, iron, galena, small quantities of silver and gold, and many varieties of marble and serpentine; also excellent granite, slate, and soapstone. The climate is healthy, but subject to extremes of temperature. Winter begins about the end of November and lasts until the middle of April. All the territory which the province embraces, together with much more, was first taken possession of in 1534 by a Frenchman named Jacques Cartier. The first permanent settlement was made at what is now the city of Quebec in 1608 by the French; the next on the present site of Montreal in 1642; and from that period until 1759 the French continued to occupy the country, though much harassed by the Indians. During that year an English army, under gen. Wolfe, captured Quebec, and shortly afterwards the whole province was surrendered to the English with the rest of Canada. In 1794, when Canada was divided into two portions, this province became known as Canada East. Then in 1841 it was again united to Canada West. Upon the organization of the dominion in 1857, however, it was separated a third time, and became a distinct province with the city of Quebec as its capital. It is divided into 59 electoral counties, and the chief cities are Montreal (pop. in '71, 107,225), Quebec (pop. 59,699). Three Rivers (pop. 7,570), and St. Hyacinthe (pop. 8,746). In 1871 the total pop. of the province was 1,191,516, of whom 929,817 were of French origin, 123,478 of Irish, 69,822 of English, 49,458 of Scotch, 7,963 of German, and 148 of African. There were also nearly 7,000 Indians residing in the province. The numbers of persons engaged in various occupations and industries were: agriculture, 160,641; trade, 25,507; industrial pursuits, 65,707; professional, 15,376; servants, 21,186. The rest were unclassified. A majority of the inhabitants speak the French language, and the laws are obliged to be printed in both French and English. The region s. of the St. Lawrence river and w. of the meridian of Quebec is the portion most thickly settled. Among the agricultural products, oats, potatoes, and hay are the largest crops. Wheat, barley, rye, peas, beans, buckwheat, Indian corn, turnips, flax, apples, tobacco, and hops are also raised. The chief articles manufactured are flour, lumber, furniture, leather, hardware, paper, chemicals, soap, boots and shoes, cotton and woolen goods, steam-engines, and agricultural implements. Along the gulf of St. Lawrence most of the inhabitants are fishermen. Cod, herring, salmon, seals, mackerel, and lobsters abound in great numbers in the gulf, and the annual yield of the fisheries is usually large. For the year 1874 the amount derived from this occupation was estimated at $1,608,660. The value of exports to foreign countries in 1874, chiefly forest products, fish and fish oils, furs, cattle, hides, and the ores of metals, was $46,393,845, of which $36,099,441 were to Great Britain, and $5,812,596 to the United States. The principal articles imported were cotton and woolen goods, silks, iron and hardware, sugar, molasses, tea, tobacco, wheat, coal, and liquors. The total value was $51,980,870, which included $32,749,888 of imports from Great Britain and $12,703,967 from the United States. The province is connected with the latter country and Ontario by several lines of railroads, the greatest among which is the Grand Trunk railway and its 5 branches.

The executive power of the province is vested in a lieut.gov., appointed by the gov.gen. of the dominion of Canada, assisted by a secretary and registrar, minister of public instruction, treasurer, attorney-general, commissioner of crown-lands, commissioner of agriculture and public works, and solicitor-general, appointed by himself. The provincial parliament consists of a legislative council of 24 members, appointed for life, and a legislative assembly of 65 (one from each electoral district), elected by the qualified voters for four years. The right of suffrage is conferred on all male British subjects 21 years of age who possess a small property qualification. The principal courts are the queen's bench, consisting of a chief justice and four puisné judges, and a superior court, with a chief justice and 25 puisné judges. The public schools are under the direction of the minister of public instruction, assisted by a council of 16 Catholics and 8 Protestants. They are classified as primary, model, and special schools, the last of which includes agricultural, high, commercial, industrial, and classical. There are also two Roman Catholic and one Protestant normal school supported by the province. Of the colleges and universities in the province, the most important are the university of Bishop's college at Lennoxville, McGill university at Montreal, and the Laval university at Quebec, attached to which are medical, law, and theological schools. Besides these there are 12 or 15 classical colleges and about the same number of industrial colleges.

The majority of the inhabitants of the province are Roman Catholics. In 1871 they numbered 1,019,852 with 610 church organizations; and the Protestants 169,232, the chief denominations being Episcopal and Methodist. The Anglican church has bishops at Montreal and Quebec; the Roman Catholics at Quebec, Montreal, Ottawa, Three Rivers, St. Hyacinthe, and Rimouski. Of the Protestant church organizations, the Baptists have 32; the Episcopalians, 176; the Methodists, 131; and the Presbyterians, 94. See CANADA.

QUEBEC, a co. in the s.w. part of the province of Quebec, partly bordering on the n. bank of the St. Lawrence river, and including within its limits the city of Quebec; area, 2,598 sq.m.; pop. in '71, exclusive of the city, 19,607. Capital, Charlesbourg.

QUE'DAH, KEDAH, KEDDAH, KEEDAH, or KIDAH, a half-independent state, on the w. coast of the Malay peninsula, on the strait of Malacca. It extends from about lat. 5° n., to lat. 7° n., and its average breadth is about 50 miles. The British province Wellesley, which lies between it and the sea-coast opposite to Penang, was separated from it and ceded to the British in 1800, by a treaty in which the British agreed to pay the rajah $10,000 a year. Quedah nominally owes a kind of feudal subjection to Siam, but is in reality much more subject to the sway of Britain.—The capital, from which the state takes its name, stands at the mouth of a river also of the same name, in lat 6° 6' n., and long. 100° 20' east. Its pop. is estimated at about 21,000.

QUED'LINBURG, a t. of Prussian Saxony, at the northern base of the Harz mountains, on the river Bode, and 35 m. s.w. of Magdeburg. Founded by Henry the fowler in 920, it consists of an old town, a new town, and several suburbs, and is surrounded by a wall flanked with towers. On an eminence overlooking the town stands the castle, which, prior to the reformation, was the residence of the abbesses of Quedlinburg, who were independent princesses of the empire, and had a vote in the diet, and other privileges. This town was a favorite residence of the German emperors of the Saxon line. Here Klopstock was born. It is now the center of considerable industry. Cloth is manufactured, and there is a good trade in corn and cattle. Pop. '75, 17,044.

QUEEN (Sax. *cwen*, woman; Gr. *gyne*, woman; Sansk. *goni*, mother, from *gan*, to generate), in its primary signification, the king's consort, who has in all countries been invested with privileges not belonging to other married women. The English queen, unlike other wives, can make a grant to her husband, and receive one from him. She can sue and be sued alone, and purchase land without the king's concurrence. The statute of treasons makes it treason to compass her death, or to violate her chastity, even with her consent, and the queen consenting, is herself guilty of treason. If accused of treason, the queen is tried by the peers of the realm. A duty, amounting to one-tenth of the value of fines on grants by the crown, was in former times due to the queen, under the name of queen-gold. Charles I. purchased it from his consort, Henrietta Maria, in 1635, for £10,000, but it was not renewed at the restoration. The queen-consort is exempt from paying toll, and from amercements in any court. She has a household of her own, consisting of six ladies of the bedchamber, a lord-chamberlain, vice-chamberlain, mistress of the robes, master of the horse, and three equerries, as also her attorney-general and solicitor-general, distinct from those of the king, who are entitled to take a place within the bar along with the king's counsel, and prosecute suits in law and equity for the queen. It has been the usual practice to crown the queen-consort with solemnities similar to those used in the coronation of the king. In the case of queen Caroline, consort of George IV., who was living apart from her husband, this was not done, though her right to coronation was argued by Mr. Brougham before the privy-council. Certain rents or revenues were anciently appropriated to the income of the queen, but no separate revenues seem ever to have been settled on any queen-consort by parliament. Her personal expenses are defrayed from the king's privy purse.

The *queen-dowager* is the widow of the deceased king. She retains most of the privileges which she enjoyed as queen-consort, nor does she lose her dignity by re-marriage; but it has been held that no one can marry the queen-dowager without permission from the king, on pain of forfeiture of lands and goods. On the marriage of a king, or accession of an unmarried prince, parliament makes provision for the queen's maintenance, in case of her survivance. An income of £100,000 a year, with two residences, was settled on the queen of George III.; and the same provision was made for the late dowager-queen Adelaide, at the commencement of the reign of William IV. The queen-dowager, when mother of the reigning sovereign, is styled the queen-mother. Until the time of George II., queens-consort bore the arms of the king impaled with their paternal coat, with the king's dexter and their paternal sinister-supporter; since that period, they have used both royal supporters. It is not usual to place the arms of the queen-consort within the garter.

The *queen-regnant* is a sovereign princess who has succeeded to the kingly power. In modern times, in those countries where the Salic law does not prevail, on failure of males, a female succeeds to the throne. By an act of queen Mary, the first queen-regnant in England, it was declared "that the regall power of this realme is in the quene's majestie as fully and absolutely as ever it was in any of her most noble progenitours kinges of this realme;" and it has since been held that the powers, prerogatives, and dignities of the queen-regnant differ in no respect from those of the king. The husband of the queen-regnant is her subject; but in the matter of conjugal infidelity, he is not subjected to the same penal restrictions as the queen-consort. He is not endowed by the constitution with any political rights or privileges, and his honors and precedence must be derived from the queen. The late prince-consort was naturalized by 3 and 4 Vict. c. 1, 2, words being used which enabled him to be a privy-councilor, and sit in parliament; and by 3 and 4 Vict. c. 3, queen Victoria was empowered to grant him an annuity of £30,000; but it was provided that his royal highness was not, by virtue of his marriage, to acquire any interest in the property of her majesty. By a decree of the queen, prince Albert enjoyed place, pre-eminence, and precedence next to her majesty.

A queen-regnant is the only woman who is in her own right entitled to bear her arms in a shield and not in a lozenge. She is also entitled to the exterior ornaments of helmet, mantling, crest, and motto, and may surround her shield with the garter, and the collars and ribbons of all other orders of knighthood of which she is sovereign.

QUEEN ANNE, a co. in e. Maryland, adjoining Delaware; bounded on the w. by Chesapeake bay; drained by Chester river and Tuckahoe creek; traversed by the Queen Anne railroad; about 405 sq.m., pop. '80, 19,257—7,192 colored. The surface is rolling. The soil is fertile. The principal productions are corn, wheat, and pork. Co. seat, Centreville.

QUEEN ANNE'S BOUNTY, the name given to a fund appropriated to increase the incomes of the poorer clergy of England, created out of the first-fruits and tenths, which before the reformation formed part of the papal exactions from the clergy. The first-fruits are the first whole year's profit of all spiritual preferments, and the tenths are one-tenth of their annual profits, both chargeable according to the ancient declared value of the benefice; but the poorer livings are now exempted from the tax. Henry VIII., on abolishing the papal authority, annexed both first-fruits and tenths to the crown; and statute 2 and 3 Anne, c. 11, first formed them into a perpetual fund for the augmentation of poor livings, and advancing money to incumbents for rebuilding parsonages. The archbishops, bishops, deans, speaker of the house of commons, master of the rolls, privy-councilors, lieutenants, and *custodes rotulorum* of the counties, the judges, queen's serjeants-at-law, attorney and solicitor-general, advocate general, chancellors and vice-chancellors of the two universities, lord mayor and aldermen of London, and mayors of the several cities: and by supplemental character the officers of the board of green cloth, the queen's council, and the four clerks of the privy council, were made a corporation by the name of "the governors of the bounty of queen Anne, for the augmentation of the maintenance of the poor clergy;" and to this corporation was granted the revenue of first-fruits and tenths. Queen Anne's charter has been regulated and supplemented by a number of statutes, the latest being 33 and 34 Vict. c. 89. According to the rules established by the trustees, the sum allowed for each augmentation is £200, to be laid out in land to be annexed to the living; this donation to be made: 1. To all livings below £10 a year; 2. To all livings below £20; and so in order, while any remain under £50. But when any private benefactor advances £200 for the augmentation of any living not above £45 a year, the trustees give another £200, though it may not belong to the class of livings which they are then augmenting.

QUEEN ANNE'S FARTHINGS. The farthings of queen Anne have attained a celebrity from the large prices sometimes given for them by collectors. Their rarity, however, has been much overrated; it was, indeed, long a popular notion that only three farthings were struck in her regin, of which two were in public keeping—a third was still going about, and, if recovered, would bring a prodigious price. The queen Anne farthings were designed by a German of the name of Crocker or Croker, principal engraver to the mint, and were only patterns of an intended coin, having never been put into circulation; but they are by no means exceedingly scarce. A few of them were struck in gold.

QUEENBOROUGH, a village in the Sheppey district of Kent, about 2 m. s. of Sheerness. It was founded by Edward III. and named after his queen, Philippa. A line of steamers recently established between Queenborough and Flushing affords a direct and rapid passage from England to the continent.

QUEEN CHARLOTTE ISLAND AND QUEEN CHARLOTTE SOUND. See VANCOUVER ISLAND.

QUEEN OF THE MEADOW. See SPIRÆA.

QUEEN-POST, the side or secondary upright ties in a trussed-roof. See ROOF.

QUEENS, a co. in s.e. N. Y., on the w. end of Long Island, bounded by the sound and the Atlantic ocean; 410 sq.m.; pop. '80, 94,507—68,507 of American birth. The surface is hilly and the soil in some parts sandy, but usually very fertile; wheat, rye, oats, corn, barley, potatoes, and butter are the staples. There are more than 100 factories of different kinds; carriages, bricks, tin and iron ware, and cordage are among the chief articles manufactured. Co. seat, Jamaica. Hempstead, Astoria, and Mineola are among the chief towns.

QUEENS, a co. in s. central New Brunswick, Canada; drained by the St. John's river, and intersected by the Grand Trunk railroad; 1480 sq.m.; pop. '71, 13,847, over 5,000 of Irish descent. The St. John's river is navigable to Frederickstown, or about 90 miles. Bituminous coal is found in large quantities near Grand lake. Co. seat, Gagetown.

QUEENS, a co. in s.w. Nova Scotia, Canada, on the Atlantic ocean, 1065 sq.m.; pop. '71, 10,554, about half of English descent. The coast is rugged, but the interior is well watered and fertile, and has much beautiful scenery. Co. seat, Liverpool.

QUEENS, a co. in center of Prince Edward's island; 771 sq.m.; pop. '71, 42,651. It is traversed by a railroad and drained by several small streams. Its capital, Charlottetown, is also the capital of the province.

QUEEN'S BENCH, or KING'S BENCH, one division of the high court of justice, other four divisions being chancery, common pleas, exchequer, and probate. The king's bench was so called from the origin of the court, inasmuch as the king used to sit there in person. In Cromwell's time it was called the upper bench. The court consists of five judges, a president (who is called the chief-justice of England, and is the highest of all the judges next to the lord chancellor), and four puisne judges called justices. In 1874 the old courts were reconstituted, and all were merged in the high court of justice, which consists of four divisions, each of which, however, retains nearly the same jurisdiction as before such change, and the only appeal from each is to the high court of appeal, which exercises the functions formerly vested in, and from remote antiquity exercised by, the house of lords. The ancient jurisdiction of the court and the history of its modifications are too technical to be stated in this place, but the outline of the leading points of jurisdiction may be shortly stated. The queen's bench is the highest court which has a criminal jurisdiction, and such jurisdiction is unlimited. But practically this jurisdiction is seldom exercised originally, for it is only when an indictment is removed from an inferior court into the queen's bench that a criminal trial takes place there, and this is only the case when there is some peculiar difficulty or importance attending the trial, which renders it expedient to remove it from the sessions or assizes. But though criminal trials in the queen's bench are exceptional, there are certain criminal matters which are part of its ordinary administration. A criminal information, for example, when filed by the attorney-general, or the master of the crown-office, charging a person with a criminal offense, is tried in the queen's bench as a matter of course, and can be tried in no other court. The queen's bench exercises a superintending control over all inferior tribunals, and also over public bodies, by commanding them to do a specific duty, the writ being called a writ of mandamus; or by prohibiting them from going on with some matter over which they have no jurisdiction, by a writ called a writ of prohibition. The queen's bench also entertains appeals from justices of the peace on a vast variety of matters. Besides the criminal jurisdiction, and the prerogative writs of mandamus, prohibition, and quo warranto, there is a civil jurisdiction belonging to the queen's bench of the most extensive kind; indeed, any civil action to recover debts and damages may be brought there. The civil jurisdiction is mostly shared in common with the other two common-law divisions. The judges of the queen's bench are often called the queen's coroners, having a universal jurisdiction of that kind throughout England, though seldom acting in that capacity. The chief-justice has latterly been usually made a peer, or has the option of becoming one if he pleases. The officers of the court are the master of the crown-office, who attends to the criminal department of the business, and several masters of the court, who attend to the civil department. The puisne judges of the court of queen's bench rank before those of the other two common-law divisions.

QUEENS' COLLEGE, CAMBRIDGE, was founded in 1446 by Margaret of Anjou, consort of Henry VI., and refounded in 1465 by Elizabeth Woodville, consort of Edward IV. The college consists of a president and 14 foundation fellows; the fellowships being tenable for 10 years from M.A. without being subject to any restriction whatsoever; while any fellow who takes holy orders, and has not a benefice of the net annual value of £300, may hold his fellowship for life. The new statutes provide that there shall be at least 14 scholarships, tenable till B.A., ranging between £30 and £50; the number and value of the scholarships to be augmented at the discretion of the president and fellows. Besides these, there are 5 exhibitions, ranging from £12 to £20; and there are funds to the amount of £150 per annum at the disposal of the president, for the behoof of deserving students of limited means. There are likewise a number of prizes, ranging from £5 to £30. The college holds the patronage of 10 benefices in the counties of Bucks, Cambridge, Essex, Leicester, Norfolk, Notts, and Wilts.

QUEEN'S COLLEGE, OXFORD. In 1340 Robert de Eglesfield, chaplain or confessor to queen Philippa, founded, by license from Edward III., a collegiate hall in Oxford, under the name of the hall of the queen's scholars. In his statutes he sets forth his motives and objects with unusual minuteness. Theological study was the main object of the foundation. Residence was rigidly enforced, and poverty enjoined with peculiar force. The original number of the provost and fellows was to be 13, in memory of our Lord and the 12 apostles; and the ultimate number of poor boys to be educated on the foundation was 72, in memory of the 70 disciples. Few colleges, however, have disregarded more directly the wishes of their founders. When the commissioners under 17 and 18 Vict. c. 81, began their work, they found the poverty required changed into a provostship of £1000 a year, and fellowships of £300, the conditional preference to north countrymen converted into an absolute exclusion of all others; and the 72 poor children represented by 8 "taberdars," as they are called, who were alone eligible to fellowships. A separate foundation had been given to queen's by John Michel, Esq., in 1736, consisting of 8 open fellowships and 4 open scholarships. The commissioners introduced great changes. The foundations are consolidated, and the college now consists of a provost, 19 fellows, 15 scholars or taberdars, 2 Bible-clerks, and 4 Eglesfield exhibitioners. There are also upward of 20 exhibitions in this college, some of which are confined to natives of the northern counties. There are 30 benefices in the gift of the college, also the principalship of St. Edmund hall.

QUEEN'S COUNSEL are certain barristers who receive from her majesty a patent giving them preaudience over their brethren, and but for which they would rank only according to seniority of their standing as barristers. The advantage of appointing queen's counsel is this, that it enables the most able or successful counsel to take precedence of those of the same or longer standing, and to take the chief conduct of causes. In practice, there are almost invariably two counsel engaged on each side, called a leader and a junior, and the leader is generally a queen's counsel, and the junior is not. The appointment is made by the crown, on the nomination of the lord-chancellor. The practice of appointing crown counsel is adopted in Ireland, and also in Scotland. In the courts of chancery in England, it was usual for a queen's counsel to confine himself to a particular vice-chancellor's court, or to that of the master of the rolls, so that his clients might thus reckon on his attendance there; and when he went into another court, he required an addition to his fee. In the common-law courts, however, this arrangement was impracticable, and had never been adopted. It is sometimes popularly believed that the appointment of queen's counsel entitles the counsel to a salary from the crown; but this is a mistake, except as to the attorney and solicitor-general. When a queen's counsel is engaged in a criminal case against the crown, as, for example, to defend a prisoner, he requires to get special license to do so from the crown, which is always given, as a matter of course, on payment of a small fee. In courts of law and equity, a queen's counsel is entitled to preaudience over all other counsel, except those who were appointed queen's counsel before him. A queen's counsel has preaudience over all sergeants-at-law, though many of the latter obtain patents of precedence, which also make them in effect queen's counsel, as well as sergeants, and prevent them being displaced by those who come after them. The order of sergeants-at-law is much more ancient than that of queen's counsel, though now it is in point of rank inferior. The practice of appointing queen's counsel is not older than the time of sir Francis Bacon, who was the first appointed.

QUEEN'S COUNTY, an inland co. of the province of Leinster, Ireland, is bounded n. by the King's county, e. by Kildare and Carlow, s. by Kilkenny, and w. by Tipperary and King's county. Area, 424,854 acres, of which 363,153 are arable. The population, which, in 1861, was 90,750, had fallen in 1871 to 79,771, of whom 70,186 were Catholics, 8,632 Protestant Episcopalians, and the rest Protestants of other denominations. The number of acres under crop in 1875 was 143,211; cattle, 77,241; sheep, 100,502; pigs, 29,098. Queen's county for the most part is within the basin of the Barrow, which is the chief river, and is partly navigable for barges. On the north-western border lie the Slieve Bloom mountains, and the Dysart hills occupy the s.e., the rest of the surface being flat or gently undulating. In its geological structure, it belongs to the great limestone district; but the Slieve Bloom mountains are sandstone, and the Dysart hills include coal, but not in deep or profitably worked beds. Coarse linen and cotton cloths are manufactured in small quantities. The chief town is Maryborough; pop. '71, 2,731. The national schools in 1875 were 96; pupils, 12,553. Queen's county anciently formed part of the districts of Leix and Ossory; and on the submission of O'More to the English, the territory retained a qualified independence. Under Edward II. the O'Mores became so powerful that a protracted contest was maintained by them with the English. In the reign of Edward VI., Bellingham, the lord-deputy, succeeded in reannexing the territory of the O'Mores to the Pale (q.v.); and a new revolt in Mary's reign led to measures by which it was finally reduced to a shire, under the name of Queen's county, in honor of Mary, from whom also the chief town, Maryborough, was called. There are a few antiquities of interest—a perfect round tower, and two in a less perfect condition, and some ecclesiastical and feudal remains, the most important of the latter being a castle of Strongbow on the picturesque rock of Dunamase. Queen's county is traversed by the Great Southern and Western, and by the Midland Great Western railways, and also by a branch of the Grand canal. It returns two members to parliament.

QUEEN'S EVIDENCE. See KING'S EVIDENCE.

QUEENSFERRY, SOUTH AND NORTH. South Queensferry is a royal and parliamentary burgh in Linlithgowshire, on the s. shore of the firth of Forth, about 9 m. w.n.w. of

Edinburgh. It was erected into a royal burgh in 1636, but was for centuries before a burgh of regality. The walks and scenery about South Queensferry, with Hopetoun house and grounds on the w., and Dalmeny park on the e., are very beautiful, and the town itself is a good deal resorted to for sea-bathing. The Forth—much wider both above and below the ferry—here narrows to a width of only about two miles. It receives historical mention as early as the middle of the 11th c., as the ferry across which royal personages passed when traveling between Edinburgh and Dunfermline. The foundation stone of a railway-bridge across the Firth here was laid Sept. 30, 1878. Pop. '71, 1521, within the parliamentary bounds. South Queensferry is one of the Stirling district burghs.—North Queensferry, a small village in Fifeshire, on the n. shore of the firth of Forth, opposite South Queensferry; pop. '71, 382.

QUEENS'LAND. This prosperous British colony occupies the whole of the north-eastern portion of Australia, commencing at a point of the e. coast about 400 m. n. of Sydney, called Point Danger, in lat. 28° 8' south. The greater portion of the southern boundary-line is formed by the 29th parallel of s. latitude. The eastern sea-board extends about 1300 m. to cape York, the extreme northern point of the continent, in lat. 10° 40'. The mean breadth of the territory is 900 m., from the eastern coast-line to the meridian of 138° e. long., which forms the western boundary-line. This includes the greater portion of the gulf of Carpentaria, which has a seaboard of about 900 miles. The whole of Queensland comprises 669,520 sq.m.—nearly twelve times the area of England and Wales.

The portion of the colony extending along the eastern coast is indented with numerous bays, which are the outlets of many navigable rivers, having their sources in the cool gorges and deep recesses of a great mountain range, running n. and s., parallel with the sea-coast, at a distance of from 50 to 100 miles. The summits of this great "dividing range" rise from 2,000 to 6,000 ft. above the level of the sea. Numerous spurs are given off from the range in ridges sloping gradually toward the coast. These ridges are generally composed principally of quartz, and in many places form good natural roads for a considerable distance. The ridges are usually covered with a variety of fine and valuable timber. The iron-bark, blood-wood, box, and other descriptions of wood, very valuable to the farmer for fencing and building, are found here in great abundance.

Unlike almost every other portion of Australia, Queensland is correctly described as a "land of rivers and streams." These rivers find an outlet in the many large and beautiful bays and estuaries on the eastern sea-board. One of these, Moreton bay (q.v.), receives the waters of five rivers, which are always navigable. The largest of these, the Brisbane, is navigated by good-sized steamers for 75 m., and is nearly a quarter of a mile wide at a distance of 15 m. from its mouth. The principal rivers on the eastern sea-board are the Brisbane, the Burnett, the Mary, the Calliope, the Boyne, the Fitzroy, the Pioneer, and the Burdekin. The longest tidal river in Queensland is the Fitzroy, which drains an area of not less than 50 millions of acres, and is navigable as far as Yaruba, 60 m. from its estuary in Keppel bay. It receives, as its principal tributaries, the Dawson, Mackenzie, and Isaacs, large streams flowing for several hundred miles from the n.w., w., and s.w. parts of the interior. The tide at Rockhampton (40 m. from the embouchure of the river) rises 14 ft., and the stream is thus rendered navigable for vessels of considerable burden.

The banks of the rivers are usually well elevated, and in many places consist of very rich alluvium, brought down from the great mountain-ranges. This alluvial soil is frequently of very great depth, and is marked everywhere by a magnificient growth of timber, very unlike the ordinary Australian wood. The enormous fig-trees and gigantic eucalyptæ tower aloft, and spread out their great arms, festooned with vines and flowering parasites, which throw themselves over every spreading branch, and deck it with their varied and brilliant colors; the tall pine trees shoot up their straight stems to a great height; while the cedar, the myrtle, the rosewood, and tamarind trees, display their rich and green foliage in every variety of shade. A thick evergreen hedge of mangroves covers the banks, preserving them from the wash of the stream; and at certain seasons of the year, tnis is fringed with thousands of flowering lilies.

Ordinarily, the eastern sea-board part of the country assumes very much the appearance of park-scenery in Great Britain, the trees standing at some distance apart, and the ground between them being covered with grass, which is generally green and luxuriant throughout the whole year. The regularity of the showers which fall in the summer season keeps the grass growing with luxuriant verdue generally during the hot months. Exceptions to this sometimes occur, and a dry summer appears to have been experienced in this part of Australia about once in every six or seven years. The summer of 1863 formed one of these exceptional seasons. The frosts of winter being generally so slight as not to injure the vegetation, the country is almost always green from January to December.

Beyond the "Andes," or great dividing-range, the country presents features of still greater beauty and fertility. Vast plains—10, 15, or 20 m. across—stretch out their level surface unbroken by a single tree, but covered with luxuriant grass, and often purpled over with fragrant herbage. These great plains are composed of rich black soil. They are well watered with a net-work of streams, which trickle down from the gradual slopes of the mountain-range. The soil in this locality is admirably adapted for tillage; and within a certain distance of the mountain-range, the rains fall with great regularity. The land here is lightly timbered, and is cleared with less labor than on the lower lands, and the soil is proved to be peculiarly adapted for the growth of wheat of the finest quality. The yield per acre in this locality has sometimes been as much as 50, and even 60 bushels to the acre, of 63 lbs. to the bushel. The average yield may be estimated at 30 bushels per acre. Indian corn and other cereals, as well as all the European fruits, grow luxuriantly, and come to the greatest perfection in this highly favored locality, which has been called the "Garden of Queensland."

This country, w. of the great dividing-range, stretches away in a series of fine plateaux for a distance of 400 or 500 m. westward, and, with the interruptions of other mountain-ranges crossing the main range at right angles, for upward of 1000 m. toward the fertile plains bordering the shores of the gulf of Carpentaria.

A third distinct portion of Queensland is formed by the country, which falls off in a succession of steep declivities, or more gradually descending terraces, from the table-land thus described, toward the lower land, which then intervenes between these terraces and the western boundary-line of the colony and of South Australia. This portion of the territory has been rendered specially interesting from the recent discoveries, which have shown that instead of a vast and sterile desert of burning sands, the interior of Australia is, with exceptional patches of very limited extent, well grassed and watered, and suitable for pastoral, and in many places even for agricultural occupation.

The climate of Queensland is said closely to resemble that of Madeira (q.v.); the mean annual external shade-temperature taken at Brisbane being very nearly the same as at Funchal in Madeira, though it is a little hotter in the summer, and colder in the winter at Brisbane than at Funchal. Moreton bay, now in Queensland, has for many years been the resort of invalids from all the other British colonies in the southern hemisphere, and has been called the Montpellier of Australia. The summer season is hot—the thermometer rising sometimes to 100° or even 120° in the shade; but the air is dry, elastic, and healthy, and the sea-breezes temper the heat, and make it perfectly endurable, even to the outdoor laborer, in the hottest time of the year. However hot the day, the night is almost invariably cool, even in the most northern parts of the colony.

The capital of Queensland, and the seat of the local government, is Brisbane (q.v.); pop. '76, 26,953. Its situation is exceedingly beautiful. Ipswich, Rockhampton, Maryborough, Toowoomba, Gayndah, Dalby, and Bowen are rapidly rising towns. Rockhampton has already attained great importance, and promises ere long to be the metropolis of Queensland. Although only recently established, its population already exceeds 6,000 souls, and is rapidly increasing. Situated upon the largest navigable river of Queensland, it forms the commercial center and principal outlet of immense tracts of the interior country. A railway has been constructed from Rockhampton to Westwood in the direction of Peak downs, where extensive copper mines, said to vie in richness with those of Barra Barra, have been opened up, and valuable gold deposits are also being worked.

The alienation of crown-lands act, passed during the first session of the colonial parliament, revolutionized the old plan of selling land at a high upset price at auction, and the disposal of lands in Queensland is now regulated by an act passed by the colonial legislature in 1868. The following are among its provisions: Reserve lands are to be open for selection by conditional purchasers, and to be divided into (1) agricultural, (2) first-class pastoral, (3) second-class pastoral. These different classes of land are to be purchasable at the rate of 15s., 10s., and 5s. an acre respectively, payable in ten equal annual installments, in addition to survey fees. Lands thus selected are to be held on lease till the purchase-money is paid, on condition that the lessee shall inclose the land with a substantial fence, and that he shall reside on the land continuously during the period of the lease. But if within a shorter time the lessee can show that he or his bailiff has resided on the land for two years, and has made certain improvements, a grant in fee may be issued on payment of the balance of the ten years' rent. Again, heads of families, and persons 21 years of age, may select as "homesteads" lots not exceeding 80 acres of agricultural, or 160 acres of pastoral land, on payment of an annual quit-rent of 9d. per acre for the former, and 6d. per acre for the latter, during five years; the grant not to issue till the expiration of that period, and proof of continuous residence and cultivation of one-tenth of the land, or erection round it of a substantial fence. "Unconditional sales" may be made by auction. The acquirement of land by emigrants direct from Europe is facilitated by the grant of land-orders, which may be issued to each approved person who shall have paid the full cost of the passage of himself or other member of his family. The land-order warrant entitles the person, after proving that he has resided in the colony continuously for 12 months, to receive for himself and each adult member of his family a land-order to the extent of £20, and one for half that amount for each child between 1 and 12 years of age. In 1877 the number of arrivals in Queensland was 22,596, of whom 1926 were South-sea islanders, and 5,498 were adult immigrants brought out under government auspices. During the same year 10,408 persons left the colony.

The system of free grants of land to persons paying their own full passages has had the intended effect of attracting a large number of small and larger capitalists; while a system of assisted and free passages, established by a wise adoption of the same land-order system, has freely supplied a class of industrious mechanics, farm-laborers, and general servants. Notwithstanding this the demand for labor of all kinds is still on the increase.

The agricultural capabilities of Queensland are not confined to the elevated table-lands before alluded to as "the garden of the colony." On the lower lands, on the rivers and bays, and on the fertile valleys and sunny slopes of the eastern side of the range, there are many millions of acres of land immediately available for settlement, and admirably suited for tillage. In this portion of the colony settlement is advancing by a class of small proprietory farmers. The land is described as very productive, yielding two crops in the year, and capable of producing almost everything that can be grown in any part of the world. Oranges, pine-apples, figs, bananas, grapes, mulberries, peaches, nectarines, granadillas, alligator pears, guavas, flourish in great perfection and abundance, and are seen growing up side by side with wheat, maize, potatoes, and all the fruits, flowers, and vegetables of northern Europe.

Great and rapid progress has of late been made in the cultivation of cotton. The cotton-plant is said to be indigenous in this part of Australia, and in consequence of the absence of severe frosts it is also perennial. In the reports drawn up by the most competent judges on the samples of cotton from all parts of the world at the international exhibition, we find it stated, "The samples of Sea islands' cotton from the Australian colonies are far superior to cotton from any other part of the world." The New Orleans variety from Queensland is also spoken of in the report as "particularly good." Seven medals were awarded to Queensland growers, and the distinction of honorable mention was conferred on five more. The average yield per acre was estimated at 400 lbs. of Sea islands, and from 600 lbs. to 700 lbs. of Orleans; being two-thirds in excess of the average yield of the two sorts taken together in America, which is 300 lbs. per acre. The cultivation of the sugar-cane is also rapidly extending, and is proving to be one of the most remunerative products of the colony. The yield varies from one to three tons to the acre. The development of this branch of agriculture led to the introduction of South-sea islanders as laborers; the employment of whom is carefully regulated by the "Polynesian laborers act" of 1868, but is nevertheless regarded by many with great suspicion, as involving something akin to the slave-trade.

In the year 1875 the total extent of land under crops and grass was 77,347 acres. The live-stock consisted of 121,497 horses, 1,812,576 cattle, 7,227,774 sheep and lambs, and 46,447 pigs. The sugar crop produced 12,108 tons of sugar, and 651,259 gallons of molasses.

The mineral resources of Queensland are large. In 1877 the gold sent from the diggings was 373,266 oz., valued at £1,306,431; from Jan., 1860, to the end of 1874, £5,444,273 worth of gold was exported. Recently tin has been found in immense quantities, £358,550 worth being exported in 1874, besides £149,696 worth of copper. During 1874–75, 43,443 tons of coal were raised. Pearl-fishing is also carried on with encouraging results.

The chief exports are wool, tallow, gold, copper, cotton, live stock, hides, timber, and provisions. In 1874 the vessels which entered the ports of Queensland numbered 713, of an aggregate tonnage of 302,825; and 657, of 269,925 tons, cleared out. In 1875 the wool exports were 20,145,914 lbs., valued at £1,366,030; cotton, 314,454 lbs., at £8,162; preserved meat had a value of £53,198. The gross revenue was £1,261,464; expenditures, £1,404,198. The imports were £3,828,009, and the exports £3,857,576. At Jan. 1, 1877, there were 327 m. of railway and 4,708 m. of telegraph open. Taxation per head, £3 11s. 3½d. Import and export trade per head, £45 11s. 6d.

Queensland is a great pastoral country. It was an idea generally received until within the last few years, that the quality of Australian wool would degenerate as the sheep were driven toward the north. The reverse of this, however, proves to be the case. The Queensland wool is remarkable for the fineness of its quality; and this seems to be increasingly the case as the pastoral occupation of the country extends northward toward the plains of Promise on the gulf of Carpentaria. The wool diminishes a little in quantity, the fleeces being lighter, but the increased fineness of the wool more than makes up for a little diminution in its quantity.

Queensland was erected into a separate and independent colony in Dec., 1859. The government is vested in a governor (the queen's representative), an executive council, and two houses of parliament. The legislative council consists of 30 members, nominated by the crown for life, under a president elected by themselves. The house of assembly comprises 55 deputies elected for five years. The number of registered electors is 35,197. The suffrage is not universal, but within the reach of every industrious man after a twelvemonth's residence. Voting is by ballot. State aid to religion was abolished by one of the first acts of the parliament. An excellent system of primary education, which since 1870 has been made free, is in successful and vigorous operation throughout the colony. The population in the beginning of 1871 was 120,306, which had been augmented on May 1, 1876, to 173,283.

QUEEN'S METAL, an alloy formed by fusing 100 parts of tin with 8 parts of antimony, 4 parts of copper, and 1 part of bismuth. It is a kind of Britannia metal, and is used for tea-pots and similar articles of domestic utility.

QUEEN'S REGULATIONS, or KING'S REGULATIONS, are those collections of orders and regulations in force in the army and navy respectively, which serve to guide commanding and other officers in all matters of discipline and personal conduct. The queen's regulations for the navy also in a great degree regulate matters of finance; whereas, in the army, financial matters are left to the war-office regulations (q.v.). The reason for this distinction is, that as regards the navy, the admiralty are responsible both for discipline and finance; while in respect to the army the officer commanding-in-chief controls the discipline, and the financial secretary the finance, both of course being responsible to the secretary of state for war, and through him to parliament. The regulations for the army were first collected in 1788, since which several editions have been issued, the last being in 1873 The latest admiralty regulations bear date 1844. The current regulations are supplemented, corrected, and canceled by numerous circulars and addenda; so that they never represent the whole body of military or naval rules for many days together

QUEEN'S TOBACCO-PIPE, the facetious designation of a peculiarly shaped kiln, which is situated in the n.e. corner of the tobacco warehouses belonging to the London docks. These warehouses are rented by government at £14,000 annually. The kiln consists of a circular brick stalk, bulging out at the bottom to a width of five feet inside. A side-door of massive iron, lettered "V. R., the kiln," gives access to the interior, in which are piled up damaged tobacco and cigars, and contraband goods, such as tobacco, cigars, tea, etc., which have been smuggled, books which are attempted evasions of the copyright act, etc., till a sufficient quantity has accumulated, when the whole is set fire to and consumed. The total value of the goods thus destroyed is enormous; and though this wanton destruction has often been censured, government still persists in the practice of periodically filling and lighting "the queen's pipe."

QUEENSTOWN. called formerly COVE OF CORK, Ireland, a seaport t., on the s. side of Great island, in the harbor of Cork, is distant from Cork 14 m. e.s.e., and from Dublin 157 m. s.w. by west. It rose into some importance during the French war, as the port of embarkation for troops going on foreign service, and is now an admiral's station. On the occasion of the queen's visit in 1850, the name Queenstown was given to it in honor of her majesty. The formation of the town is rather peculiar, as it occupies the sides of an amphitheater, around which it is built in parallel streets. It enjoys a high reputation for its mild and salubrious climate, and is much frequented by invalids during the winter season. A splendid Roman Catholic cathedral, estimated to cost £100,000, is in course of erection; it will be 100 ft. in height, surmounted by a tower of 230 feet. Pop. '71, 10,334.

QUEEN'S YELLOW. See YELLOW COLORS.

QUEK'ETT, JOHN THOMAS, 1815–61; b. Eng.; studied medicine at the London hospital in 1831; became a licentiate of the apothecaries' company and a member of the Royal college of surgeons; in 1843 appointed assistant conservator of the Hunterian museum, and in 1856 conservator of the museum and prof. of histology on the retirement of prof. Owen. He published *Practical Treatise on the Use of the Microscope; Lectures on Histology*, 2 vols.; *Illustrated Catalogue of Specimens in the College Museum in Lincoln's Inn Fields.*

QUELPAERT, an island off the s. coast of Corea, the scene of many shipwrecks of vessels of various nations. The island is distant 60 m. from the main-land, is very fertile, and its extensive plains are well cultivated. Cattle and small wild horses are very numerous. Timber abounds on the hills, over which mount Auckland, 6,600 ft. high, towers in imposing proportions, its masses of white rock seen far out at sea resembling snow. The chief industry of the dense population is straw-plaiting, the best hats in Corea coming from this island. Having long been a place of exile for convicts, the character of its inhabitants is not reputed very high, though shipwrecked foreigners have been, in the main, kindly treated. Its rock-bound coast has scarcely a harbor worthy of the name.

QUERCITRON, the name both of a dyestuff and of the species of oak of which it is the bark. This oak (*quercus tinctoria*), also called *dyer's oak* and *black oak*, is a native of North America—one of the noblest forest trees of the United States, found in New England, and as far south as Georgia, although there only at a considerable elevation. The name black oak is given to it from the dark color of its outer bark. The leaves are obovate-oblong, dilated outward, and widely sinuated; with short, obtuse, and bristle-pointed lobes. The wood is reddish, coarse-grained, and porous, but much esteemed for strength and durability, and is used in America for ship-building. The bark is used for tanning as well as for dyeing. It is the inner bark which is the quercitron of dyers. It yields a yellow crystallizable substance, *quercitrin* ($C_{36}H_{18}O_{20} + 2Aq$), which may be extracted by means of alcohol; the tannic acid, which is simultaneously taken up, must be precipitated by the addition of gelatine, after which the liquid will, on evaporation, yield crystals of quercitrin. On the addition of alum, its solution assumes a beautiful yellow color; and solutions of acetate of lead, acetate of copper, and chloride of tin precipitate it in yellow flakes. When boiled with dilute acids, it breaks up into glycose and *quercetin* ($C_{24}H_8O_{10}$)—a yellow crystalline substance, which is soluble in alkaline solutions, to which it communicates a golden-yellow color. The decomposition shows that quercitrin belongs to the glycosides, or compounds which, when broken up, yield sugar.

QUERÉTA'RO, one of the smallest of the Mexican states, situated on the Anahuac table-land between the states of Mexico, Michoacan, Guanajuto, San Luis Potosi, and Hidalgo; about 3,205 sq.m.; pop. 171,666, many of whom are Indians. The soil is fertile; maize and cotton are raised, besides the common fruits and cereals. There are mines of silver, lead, copper, and iron. The principal manufactures are woolen cloth, cotton goods, soap, pottery, and iron-ware.

QUERETA'RO, an important t. of Mexico, capital of a state of the same name, is charmingly situated on a hilly plateau, 6,365 ft. above sea-level, 110 m. n.w. of Mexico. It is built on a regular plan, contains 11 convents, 3 great squares, many richly-decorated churches, etc. Water is supplied from an aqueduct 10 m. long, and supported in part upon arches 90 ft. high. Woolen and cotton goods and leather are the chief manufactures. Queretaro contains the largest cotton-spinning mill in the country; 3,000 hands are employed in it. Here, when the town, after a long defense, fell into the hands of the republicans, the emperor Maximilian was shot by order of a court-martial, June 19, 1867. Pop. 48,000.

QUERN, a primitive mill for grinding corn, the stone of which was turned by the hand before the invention of windmills or water-mills. It is a contrivance of great antiquity, and so well adapted for the wants of a primitive people, that we find it perpetuated to the present day in remote districts of Ireland, and some parts of the western islands of Scotland. The remains of querns have been dug up in Britain, Ireland, and continental Europe, wherever the traces of ancient population are found. They occur in the Scottish earth-houses (q.v.), or cyclopean underground dwellings; in the crannoges (q.v.), or lake-dwellings of Ireland and Scotland; and the very similar *pfahlbauten* of Switzerland; and abundantly among the remains of the Roman period in Britain and northern Europe. The most usual form of quern consists of two circular flat stones, the upper one pierced in the center with a narrow funnel, and revolving on a wooden or metal pin inserted in the lower. The upper stone is occasionally ornamented with various devices; in the Roman period, it is sometimes funnel-shaped, with grooves radiating from the center. In using the quern, the grain was dropped with one hand into the central opening, while, with the other, the upper stone was revolved by means of a stick, inserted in a small opening near the edge. As early as 1284 an effort was made by the Scottish legislature to supersede the quern by the water-mill, the use of the former being prohibited except in case of storm, or where there was a lack of mills of the new species. Whoever used the quern was to "gif the threttein measure as multer;" the contravener was to "tine [lose] his hand-mylnes perpetuallie." This enactment did not, however, prevent hand-mills from being largely used in Scotland down to the beginning of the present century.

Probably the oldest type of quern is that which was fashioned from a section of oak; one of this description was found in Scotland in 1831, in the course of removing Blair Drummond Moss. It is 19 inches in height by 14 in diameter, and the center is hollowed to a depth of about a foot, so as to form a mortar, in which the grain seems to have been pounded by a wooden or stone pestle.

A less simple variety of the hand-quern, known as the pot-quern, and also of great antiquity, consists of a circular stone basin, with a hole through which the meal or flour escapes, and a smaller circular stone fitting into it, perforated with an opening through which the grain was thrown into the mill. A number of querns of this description have been exhumed in Scotland, and still more in the bogs of Ireland, in which country the pot-quern is believed not to be yet altogether disused. The one in the museum of the Scottish antiquaries is of unusually large size, 17 inches in diameter, and 8½ high, and was discovered in the parish of Gladsmuir, in east Lothian. It is made of coarse pudding-stone, and is furnished with holes in the sides, to which handles were probably attached. The iron ring is a modern addition.—See Dr. Wilson's *Archæology* and *Prehistoric Annals of Scotland*, vol. i. p. 211, *et seq.*, 2d edition (London and Cambridge, 1863).

QUESA'DA. See XIMENES DE QUESADA.

QUESNAY, FRANÇOIS, an eminent French economist and physician, was born at Mérey, near Montfort-l'Amaury, June 4, 1694, and studied at Paris, where in 1718 he passed surgeon with a high reputation. He acquired a high reputation in his profession, and at his death, in 1774, was first physician to the king. But Quesnay's fame depends almost wholly on his economistic speculations, which are to be found scattered through the pages of the famous *Encyclopédie* (see, for example, the articles "Fermiers" and

"Grain"), the *Journal d'Agriculture*, and the *Ephémérides au Citoyen*. He is the inventor of the term "political economy," and one of the earliest and most distinguished writers on the subject. His views were systematically set forth in a little treatise, entitled *Tableau Economique*, which was nicknamed by La Harpe, the *Alcoran des Economistes*. Only a few copies of this work were printed about the end of the year 1758, and these have now all disappeared. Nevertheless, the principles maintained by Quesnay are well known, partly from the sources above mentioned, but chiefly from other treatises that have met with a better fate than the *Tableau*, viz., his *Maximes Générales du Gouvernement Economique d'un Royaume Agricole*, the *notes* to which occupy more space than the text; *Le Droit Naturel; Analyse du Tableau Economique; Problèmes Economiques;* and *Dialogues sur le Commerce et sur les Travaux des Artisans*, all of which are to be found in Dupont's *Recueil* of Quesnay's writings (Leyden and Paris, 1768).

QUESNEL, Pasquier, a French theologian, was b. at Paris, July 14, 1634, and having been educated in the Sorbonne, entered the congregation of the Oratory in 1657. He obtained even early in his career the reputation of a profound familiarity with Scripture and the fathers; and by several popular ascetical treatises which he published, he attracted so much notice, that, at the early age of 28, he was appointed director of the Paris house of his congregation. It was for the use of the young men under his charge that he commenced the series of his afterward celebrated *Réflexions Morales*. The first specimen of this work having been much admired, Quesnel continued to extend it to other portions of the New Testament. Soon afterward he published an edition of the works of St. Leo (2 vols. 4to, Paris, 1675), which has been much criticised. His residence at Paris, however, was cut short by the disputes about Jansenism. Having refused to sign certain propositions, subscription to which was, by a decree of 1684, required of all members of the Oratory, Quesnel left the congregation and retired to the Low Countries, where he attached himself to the party of Arnauld, in which he speedily rose to the first position of influence and authority. He continued at Brussels his *Réflexions Morales;* and in 1693–94 the reflections on the New Testament were published in a complete form, with the approval of the cardinal de Noailles, bishop of Châlons, and ultimately archbishop of Paris. The work, however, on examination, was found to contain all the most obnoxious doctrines of Jansenius; and Quesnel, having been denounced to the authorities, was arrested, by order of Philip V., and put into prison. He escaped, and betook himself to concealment. But his book was condemned, first by the decree of an assembly of the bishops of France, and afterward by a decision of Clement XI. in 1711, and finally by the celebrated bull *Unigenitus*, Sept. 8, 1713. With this condemnation the formal dogmatic declarations of the Roman church on this controversy may be said to have ceased. The controversy continued, but nothing, or very little, that was new was afterward elicited. Quesnel withdrew to Amsterdam, where he lived to a great age, not having died till 1719, in his 85th year. Besides the *Réflexions Morales*, he left a vast number of treatises, chiefly ascetical. The few dogmatical essays which he published, as well as his critical edition of St. Leo, are all tinged with his peculiar opinions. The *Réflexions Morales* falling in, in the main, with the views of one of the religious parties in the Protestant church, has been translated into German and English, and at one time enjoyed considerable popularity both in England and in Germany.

QUESTOR (Lat. contr. from *quæsitor*, a searcher or investigator, from *quæro*, to seek or search into) was anciently the title of a class of Roman magistrates, reaching as far back, according to all accounts, as the period of the kings. The oldest questors were the *quæstores parricidii* ("trackers of murder," ultimately public accusers), who were two in number. Their office was to conduct the prosecution of persons accused of murder, and to execute the sentence that might be pronounced. They ceased to exist as early as 366 B.C., when their functions were transferred to the *triumviri capitales*. But a far more important though later magistracy was the *quæstores classici*, to whom was intrusted the charge of the public treasury. The exact date of their institution cannot be ascertained, but it was subsequent to the expulsion of the kings. They appear to have derived the epithet of *classici* from their having been originally elected by the centuries. At first they were only two in number, but in 421 B.C. two more were added. Shortly after the breaking out of the first Punic war the number was increased to eight; and as province after province was added to the Roman republic, they amounted, in the time of Sulla, to twenty, and in the time of Cæsar to forty. On its first institution the quæstorship (*quæstura*) was open only to patricians; but after 421 B.C., plebeians also became eligible.

QUETELET, Lambert Adolphe Jacques, a celebrated Belgian statistician and astronomer, was b. at Ghent, Feb. 22, 1796, and studied at the lyceum of his native city, where, in 1814, he became professor of mathematics. In 1819 he was appointed to the same chair at the Brussels atheneum; and in 1826 was chosen by king William I. to superintend the construction of the royal observatory in the capital, of which he became director in 1828. In 1836 he was made professor of astronomy and geodesy at the Brussels military school. Elected a member of the Belgian royal academy in 1820, he became perpetual secretary in 1834. Quetelet was besides a corresponding member of the institut de France and of the royal society of London. Among his numerous and valuable writings are: *Astronomie Elémentaire* (Par. 1826; 4th ed. Brux. 1848); *Recherches sur la Population, les Prisons, les Dépôts de Mendicité*, etc., *dans le Royaume des Pays-Bas* (Brux. 1827); *Recherches sur la Reproduction et la Mortalité et sur la Population de la Belgique* (Brux. 1832); *Statistique Criminelle de la Belgique* (Brux. 1832); *Sur l' Homme et le Développement de ses Facultés ou Essai de Physique Sociale* (Par. 1835); *Du Système Sociale et des Lois qui le régissent* (Par. 1848); and *Physique* (Brux. 1855). Quetelet was also one of the most efficient collaborateurs in drawing up the *Bulletin de la Commission Centrale de Statistique*, the *Annales des Mines*, the *Journal des Economistes*, the *Annales des Travaux Publics*, the *Trésor National*, etc. He also published numerous papers on meteorology, astronomy, terrestrial magnetism, etc., in the *Mémoires* and *Bulletins* of the Belgian royal academy. He died in 1874.

QUETZ'ALCOATL (*Aztec*, a feathered serpent or twin), the god of the air, one of the most important figures in the ancient Mexican theology. There are many conflicting legends in regard to this deity, but the main features of his earthly career, as generally agreed upon, are that he appeared mysteriously from the east, and established himself in the valley of Sula, teaching the inhabitants the arts of peace, and exhorting them to kindliness and benevolence and purity of life; that having incurred the malice of the god Tezcatlipoca, he withdrew to Cholula where he remained for twenty years, during which time the famous pyramid, still standing there, was erected in his honor; and that he then disappeared as mysteriously as he had come, with a promise to return hereafter. The fulfillment of this promise was looked for among the Mexicans with as much confidence as was the advent of the Messiah by the Jews, and much of Cortez's early success was due to the fact that when he first landed in Mexico he was taken to be the god returning to his worshipers. It is probable that Quetzalcoatl was a historical character deified after death, or the legends may refer to several heroes of the same name. The modern school of interpreters, however, are inclined to look upon him as a nature-myth, personifying the air and the light.

QUEVEDO Y VILLEGAS, Don FRANCISCO GOMEZ DE, a Spanish classic, was b. at Madrid, Sept. 26, 1580, and studied at the university of Alcala de Henares, where he acquired a good knowledge, not only of Latin and Greek, but also of Hebrew and Arabic, besides French and Italian. His career, which was chiefly that of a diplomatist, was marked by numerous vicissitudes. He died Sept. 8, 1645, at Villa Nueva de los Infantes.

The prose works of Quevedo y Villegas are divisible into two classes—the serious and the burlesque. Among the former are his *Vison of St. Paul, The Spanish Epictetus. Phocylides, Fortune become Reasonable*, and particularly *The Life of Marcus Brutus* and *The Policy of God*—the last two of which are remarkable for the purity and elevation of their sentiments. Among his satirical and burlesque productions, in which his genius finds its happiest expression, the principal are: *The Dream of the Death's Heads, The Demon Alguazil, Pluto's Stables, The Side-scenes of the World, The Letters of the Knight of the Forceps, Recollections of Student Life*, and *The Grand Sharper, or the History of Don Pablo de Segovia*, a romance of rascaldom, a species of fiction much cultivated in Spain at that time, in which the hero is usually an adventurous scamp. The lively sallies, the piquant allusions, and the happy metaphors found in these books have enriched Spanish literature with a crowd of proverbs and colloquial phrases. Quevedo y Villegas's poetry is also chiefly of a humorous character. His works have been often reprinted; the most complete edition is that by Sancho (Madrid, 11 vols. 1791–94); a more recent collection is the one by M. Guerra y Orbe (Madrid, 1852). An English translation of Quevedo y Villegas's satirical works was published at Edinburgh in 1798; his *Sueños*, or Visions, among the most popular of all his productions, were also translated into English by sir Roger l'Estrange (1708).

QUEZALTENAN'GO, a t. of Guatemala, Central America, the capital of a department of the same name. It is 66 m. w. by n. from Guatemala, and stands in an elevated table-land, on a river which flows into the Pacific ocean. After Guatemala itself, Quesaltenango is the most important town in the state. It manufactures cotton and woolen fabrics, and carries on a considerable trade. Pop. estimated at from 25,000 to 36,000, largely Indians.

QUIBERON, a small fishing t. of France, in the department of Morbihan, at the extremity of a long slender peninsula, 25 m. s.w. of Vannes. Pop. '76, 720. It is historically celebrated as the spot where a body of French emigrant royalists, under D'Hervilly and Puisaye, landed from an English fleet, on June 27, 1795, and endeavored to rouse the people of Brittany and La Vendée against the convention, but were defeated, and driven into the sea by gen. Hoche. All the prisoners taken were shot, by order of the convention. At an earlier period, during the war of the Austrian succession, an English force attempted a landing here (1746), but was severely repulsed. In 1759 admiral Hawke completely defeated a French fleet under admiral Conflans in Quiberon bay.

QUICK'ENS. See COUCH-GRASS.

QUICK-MATCH, a combustible match, made by dipping cotton-wick in a composition of vinegar, saltpeter, and sometimes an admixture of gunpowder; when lighted, it continues to burn to the end, and hence is useful in exploding mines, etc. The rate at which it burns being known, it is only necessary, for insuring safety, to take the right length of quick-match.

QUICK'SILVER. See MERCURY.

QUICHÉS, or UTLATECAS, a nation in the highlands of Guatemala, descended from the Toltecs. They made an obstinate resistance to the Spanish conquerors under Alvarado. Tecum-Uman, king of Quiché, is said to have commanded a force of 232,000 men, who fought with courage, but were overpowered by the Spanish artillery and cavalry, and driven back after a desperate struggle of six days, during which the king was killed by Alvarado. These people still speak the ancient Quiché language.

QUICHUAS, or QUITO INDIANS, the ruling race in Peru under the Incas, occupying a territory extending from Quito to lake Titicaca. They attained considerable civilization; were an agricultural people, irrigated sterile land by a system of aqueducts and excavations; mined gold and silver, and were skillful in building houses and temples of adobe or stone. They conquered the Aymaras, whose territory reached from lake Titicaca to the s. boundary of Bolivia, subdued the Huancas and Chancas in the e., and after a long struggle reduced the Yuncas, a coast tribe, whom they compelled to conform to the sun worship, the religion of the Incas, who claimed descent from the sun. The Quichuas rapidly degenerated after the Spanish conquest. They made an unsuccessful effort to regain their independence in 1780.

QUI'ETISTS, the name of a somewhat numerous class of mystical sects, who, in different ages, have held that the most perfect state of the soul is a state of quiet, in which the soul ceases to reason, to reflect, whether upon itself or on God, and, in a word, to exercise any of its faculties, its sole function being passively to receive the infused heavenly light, which, according to their view, accompanies this state of inactive contemplation. Under the various heads, FENELON, HESYCHASTS, BRETHREN OF THE FREE SPIRIT, MOLINOS, MYSTICISM, most of the details of the doctrine of the Quietists have been explained. Some of these are of a purely speculative character, and involving but little of practical consequence, whether for good or for evil. But there is one most pernicious class of errors, which, however eschewed by the leaders of the various schools, has seldom failed to characterize the practical working of the system among the vulgar crowd of its followers. From the belief of the lofty and perfect nature of the purely passive state of contemplation, there is but a single step to the fatal principle in morals, that in this sublime state of contemplation all external things become indifferent to the soul, which is thus absorbed in God; that good works, the sacraments, prayer, are not necessary, and hardly even compatible with the repose of the soul; nay, that so complete is the self-absorption, so independent is the soul of corporeal sense, that the most criminal representations and movements of the sensitive part of the soul, and even the external actions of the body, fail to affect the contemplating soul, or to impress it with their debasing influence. These results will be found detailed under some of the heads named above. The chief Quietist sects have been the Messalians or Euchites, in the 4th c.; the Bogomili, in the 11 c.; the Beghards and Beguines, in the 13th c.; the Hesychasts, in the east, about the same period; the Brethren of the Free Spirit, in the 14th c.; Michael Molinos, in the 17th c.; and others of less note.

QUILIMA'NÉ, a sea-port of eastern Africa, in the Portuguese territory of Mozambique, stands about 15 m. from the mouth of the river of the same name. The town itself, or village, stands on a large, moist mud-bank (in any part of which water can be found by digging two ft. deep), surrounded by mango-bush and marsh. The climate is unhealthy in an eminent degree. The bar at the harbor is extremely dangerous, and the volume of water is so small, that the bed of the small stream which communicates between the Quilimane and the Zambesi (q.v.) is dry for at least nine months in the year. During the dry season trade is carried on by land-carriage. Pop. about 15,000, including the inhabitants of the country in the immediate vicinity of the town.

QUILLA'IA, a genus of plants of the natural order *rosaceæ*, the type of a tribe called *quillaieæ*, with herbaceous calyx-tube, capsular fruit, and seeds winged at the apex. The suborder is remarkable for saponaceous secretions. The barks of some species of *quillaia*, as *Q. saponaria* and *Q. Brasiliensis*, are used in South America, under the name of *quillai*, as a substitute for soap. They contain a substance closely allied to *saponine*.

QUILLED, in heraldry, a term used in describing a feather, to indicate that the quill differs in tincture from the rest.

QUILLO'TA, a t. of Chili, in the province of Valparaiso, and 22 m. n.e. from Valparaiso, on the Aconcagua, about 20 m. from its mouth. Quillota is a station on the railway from Valparaiso to Santiago, and is a place of some importance and considerable trade, the richest copper-mines of Chili being in its vicinity. To almost every house is attached a vineyard, but no wine is made. Pop. '75, 11,869.

QUILLS, the large feathers of the wings of birds, the hollow tubes of which, being properly cleaned of all oily or fatty matter, and dried, are used for making pens to write with. The exact time of their introduction to use for this purpose is not known. Those plucked from geese are most generally used, but swan and turkey-quills are not uncommon; and for very fine writing, and for pen-and-ink drawing, crow-quills are preferred to all others. At one time, the collection and preparation of quills formed a very large and important branch of commerce; but the introduction of metallic pens has reduced it to very small limits. The following are the chief kinds sold by the dealers, and the list gives a correct indication of the sources of supply: Swan-quills, Iceland, etc.; English goose-quills, Irish goose-quills, Hudson's bay goose-quills, Dutch goose-quills, St. Petersburg goose-quills, Riga goose-quills, Turkey goose-quills, British crow-quills, duck-quills for tooth-picks. Our imports amount to nearly 300,000,000 per annum, the value of which is about £250,000. Those of the swan fetch the highest price, or about four guineas per thousand; whilst the best goose-quills rarely exceed 20 shillings. After they have been carefully scraped and cleaned, the drying is effected by gentle heat in ovens, by which they acquire a necessary brittleness in a longitudinal direction. This is important, as, without this property, we could not make the fine slit, upon which the whole working character of the pen depends.

QUILLWORT, a genus of cryptogamic plants whose stems have a resemblance to quills. It is placed by some with the *lycopodiaceæ*, while others assign it a separate order. The spore-cases are orbicular, plano-convex, and sessile in the axis of the leaves, the bases of which are hollowed out for the sporangia, which are united to them by the back. The spores in the outer, are much larger than those of the inner leaves, and are called *macrospores*, of which there are from 30 to nearly 200 in a spore-case. The *microspores* are very minute, each case containing, it has been estimated, over a million of them. There are about a dozen species in North America, chiefly ranging from New England to lake Superior. They are mostly aquatic evergreens, and escape notice from this circumstance, although they are not rare.

QUILOA. See Kilwa.

QUILON (*Kayan Kulan*), a t. of India, in the state Travancore, 35 m. n.w. from Trivanderam. It is situated on the sea-coast, in a bight where ships may anchor and have shelter. Quilon has a barrack for European troops, a hospital, a jail, etc. There is a considerable export trade in timber, cocoa-nuts, ginger, pepper, etc. The communication with Trivanderam is almost entirely by canals, connecting the lagoons of the *backwater*. There is similar water-communication with towns further northward on the coast. Pop. estimated about 20,000.

QUILTOR, a fistulous wound about the top of the horse's foot, results from treads, pricks, or neglected corns, which lead to the formation of matter underneath the hoof. Any dead horn, matter, or other cause of irritation must be sought for by cutting away the hoof. A free opening must be provided for the egress of any pent-up matter. Poulticing for a few days is often useful; whilst healing may afterward be expedited by the injection of any mild astringent lotion. The powerful caustics so frequently used cause much unnecessary pain, and often aggravate the evil.

QUIMPER, an old t. of France, capital of the department of Finistère, is prettily situated on the Odet, about 9 m. from its mouth, and about 35 m. s e. of Brest. Its cathedral, a stately and richly-carved and ornamented edifice, commenced in 1424, is the principal building. Potteries are in operation, as well as tan-yards, breweries, etc., and sardine-fishing is actively carried on. Pop. '76, 13,879.

QUIN, James, a celebrated actor of Irish descent, was b. in London, Feb. 24, 1693, and made his first appearance on the stage in 1714 at Dublin as Abel in *The Committee*. Shortly after he proceeded to London, where he was engaged at Drury Lane, but for quite inferior parts. In 1716, however, the sudden illness of a leading actor led to Quin's being called on to sustain the character of Bajazet in the once famous play of *Tamerlane*. His success was marked. Next year, he exchanged Drury Lane for Mr. Rich's theater at Lincoln's Inn Fields, where he remained as a principal actor 17 years. Not long after leaving the former place, he had the misfortune to kill a brother-actor, Mr. Bowen, in a duel—a circumstance which clouded his reputation for a while. The only really fine parts which he seems to have played were captain Macheath in the *Beggars' Opera*, and Falstaff in the *Merry Wives of Windsor*. In 1734-35, he returned to Drury Lane theater, "on such terms," says Cibber, "as no hired actor had before received;" and from this date until the appearance of Garrick in 1741 he was, by universal consent, the first actor in England. Quin was by no means pleased at the rising fame of Garrick, and sarcastically expressed his chagrin by declaring that "Garrick was a new religion, and that Whitefield was followed for a time; but they would all come to church again." In this, however, he was mistaken. In 1751 he withdrew from the stage as a hired actor, though he continued at intervals to give his services for benevolent purposes, and fixed his residence at Bath, where he died Jan. 21, 1766. In after-dinner conversation he was a coarse but capital story-teller, and many of his jests are still in vogue.

QUINAULT, Philippe, 1635-88; b. France; author of *Les Rivales* and *La Mère Coquette, ou les Amants Corrigés*, comedies; and of *Astarte*, a tragedy; also of lyrical tragedies set to music by Lully. He was a member of the French academy.

QUINCE, *Cydonia*, a genus of trees and shrubs of the natural order *rosaceæ*, suborder *pomeæ*, nearly allied to *pyrus*, with which many botanists have united it, but distinguished by having many instead of two seeds in each cell, and by their very mucilaginous nature. The COMMON QUINCE (*C. vulgaris*), a native of the s. of Europe and temperate parts of Asia, is a low tree, with generally tortuous branches; ovate, entire, deciduous leaves, which are downy on the under side; and rather large, whitish flowers, which are solitary at the extremity of young branches. The fruit is in some varieties globose; in others, pear-shaped, of a rich yellow or orange color, with a strong smell. It is hard and austere, but when stewed with sugar, becomes extremely pleasant, and is much used in this way either by itself, or to impart a flavor to apple-pies. It is also much used for making a preserve called *quince marmalade*. A delicious beverage, somewhat resembling cider, is made from it. The seeds readily give out their mucilage to water, so that they turn 40 or 50 times their weight of water into a substance as thick as syrup. Quince mucilage, or quince gum. *cydonin*, is allied to bassorin, but differs from it in being readily soluble in water, whilst it differs also in some particulars from Arabin. See GUM.—The quince was cultivated by the ancient Greeks and Romans, and is at the present day cultivated in the s. of Europe, in England, and generally in temperate climates. In Scotland the fruit seldom ripens except on a wall.—The JAPANESE QUINCE (*C. Japonica*, better known by its older name, *pyrus japonica*), a low bush, a native of Japan, but perfectly hardy in Britain, is often to be seen trained against walls, being very ornamental from the profusion of its beautiful flowers.

QUINCY, a city of Illinois, on the e. bank of the Mississippi river, 160 m. n. of St. Louis, is handsomely built on a high bluff, and has a large tradé by the river, railway connections with Chicago, Toledo, etc., extensive manufactures, 7 banks, 8 newspapers, and 30 churches. Pop. '70, 24,052.

QUINCY (*ante*), the co. seat of Adams co., Ill., on the Chicago, Burlington and Quincy, the Hannibal and St. Joseph, the Quincy, Alton and St. Louis, the Wabash, and Quincy, and the Missouri and Pacific railroads; pop. '80, 27,275. It is a thriving and beautiful place, regularly laid out, and has many fine residences. The streets are lighted with gas. The city has water-works, and a fire department with several steam-engines. There are 2 lines of horse-cars. There are 4 parks in the city. The fair-grounds, containing 80 acres, are 2 m. distant. There are steam saw-mills, steam flour-mills, breweries, distilleries, grain-elevators, machine-shops, carriage manufactories, etc. Steamboats run from Quincy up and down the river.

QUINCY, a t. in Norfolk co., Mass., on the Old Colony railroad; 7 m. s.e. of Boston; pop. '80, 10,529. It has churches, schools, banks, a newspaper, a public library, a granite town-hall, and the Adams academy for boys, founded by John Adams, and opened in 1872. The Quincy granite is shipped to all parts of the country. John Adams, John Quincy Adams, and John Hancock were born in Quincy. Among the notable houses are those of the Adams and Quincy families. The town was set off from Braintree in 1792.

QUINCY, EDMUND, 1681–1738; b. Mass.; educated at Harvard college. He was for many years a member of the Massachusetts legislature and of the executive council. In 1718 he was appointed a justice of the state supreme court, and in 1737 was sent to England as the agent of Massachusetts to secure a settlement of the dispute between Massachusetts and New Hampshire as to their boundary line; and he died while on this mission.

QUINCY, EDMUND, 1808–77; b. Boston; graduated at Harvard college in 1827. He was an early abolitionist, a frequent contributor to the *Anti-Slavery Standard*, of which he was at one time editor, and secretary of the American anti slavery society. He published in *Putnam's Magazine*, 1853, a novel called *Wensley*, and wrote a *Life of Josiah Quincy*.

QUINCY, ELIZA SUSAN, b. Mass., 1800; daughter of Josiah. She has written *Memoir of Eliza Susan Morton Quincy*, 1861; and *Memoirs of the Family of Edmund Quincy of Wollaston*.

QUINCY, JOSIAH, Jr., 1744–75, b. Boston; graduated at Harvard college in 1763; read law with Oxenbridge Thacher, and was admitted to the bar, rising to a high rank in his profession. He denounced the stamp act through the press and at public meetings in Boston, and took strong ground against the exactions of parliament. His part in bringing on the revolution was greater than that of any other Massachusetts man except, perhaps, Joseph Warren and James Otis. In 1770 he conducted, in the face of an excited popular feeling, the defense of the British soldiers implicated in the Boston massacre; three years later, he went to Charleston, S. C., on account of his health, and took advantage of his journey to enter into relations with the patriot leaders in the southern and middle states, and to arrange for a system of communication between them and the leaders of the same party in Massachusetts. In 1774 appeared his *Observations on the Boston Port Bill*, which clearly indicated war as the only means of settling the disputes between Great Britain and the colonists, and intimated that independence must be the result. The work had much effect both at home and in England, where it was republished. An attempt was made by means of an anonymous letter to induce him not to publish the book; but the only result was a short reply by Quincy in the *Massachusetts Gazette.* The same year he went to England, where he lived on friendly terms with Barré, Franklin, the earl of Shelburne, Priestley, and other friends of the colonies, and had interviews with lords Dartmouth and North. He carried on a correspondence with the whigs at home, and his activity drew from lord Hillsborough, in the house of lords, the remark that if the government performed its duty he "would be in Newgate or Tyburn." He sailed for home in the spring of 1775, but died on the voyage. His life was written by his son Josiah, and his *Reports of the Supreme Court of Massachusetts Bay,* 1761–72, edited by his great-grandson Samuel M., appeared in 1865.

QUINCY, Josiah, an American lawyer, orator, and man of letters, and son of Josiah Quincy, a distinguished orator of the revolution, was b. at Boston, Feb. 4, 1772; graduated at Harvard college, 1790; studied the profession of law; took an active interest in politics as a leading member of the federal party in New England; entered congress in 1805, where he became distinguished as a ready, earnest, and fervent orator, in opposition to the policy of Jefferson and Madison. He was one of the earliest to denounce slavery in congress, and declared that the purchase of Louisiana was a sufficient cause for the dissolution of the union. Disgusted with the triumph of the democratic party and the war of 1812 he declined a re-election to congress, and devoted his attention to scientific agriculture. He became, however, a member of the senate of Massachusetts, and in 1822 judge of the municipal court of Boston. In 1823 he was elected mayor of Boston; and in 1829 accepted the post of president of Harvard college, which he held until 1845. Among his published works are a memoir of his father, 1825; *History of Harvard University,* 1840; *History of the Boston Athenæum,* 1851; *The Municipal History of the Town and City of Boston,* 1852; *Life of John Quincy Adams,* 1858; *Essays on the Soiling of Cattle,* 1859. Born before the American revolution, in which his father took an active and distinguished part, he lived to denounce the secession of the confederate states in 1860, and urge on the war for their subjugation. He died at Boston July 1, 1864.—His son, Edmund Quincy, is a distinguished author and orator, and was an active member of the abolitionist party.

QUINCY, Josiah, b. Boston, 1802; son of Josiah. He graduated at Harvard in 1821, and was admitted to the bar. He was a member of the Boston city council 1833, and its president 1834–37. In 1842 he was president of the Massachusetts senate, and in 1845 mayor of Boston. By his efforts and during his mayoralty the Cochituate aqueduct was completed. He has been a prominent advocate of co-operative methods in trade.

QUINCY, Quatremère de. See Quatremère De Quincy.

QUINCY, Samuel Miller, b. Boston, 1833; educated at Harvard college, and called to the bar. He was associate editor with John Lowell, now judge of the U. S. circuit court, of the *Monthly Law Reporter.* He served through the war, was col. of a colored regiment, and rose to the rank of brevet brig.gen. He published in 1865 *Reports of the Superior Court of the Province of Massachusetts Bay,* 1761–72, by J. Quincy, jr.

QUINIC ACID. See Kinic Acid, *ante.*

QUINET, Edgar, a French author, was b. at Bourg, in the department of Ain, Feb. 17, 1803, and studied at Lyon and Paris. He made his literary *début* at the age of 20 by his *Tablettes du Juif Errant,* after which his love of philosophy and mystic reverie led him to Germany. He studied at Heidelberg, and on his return to France published a translation of Herder's *Ideen zur Philosophie der Geschichte der Menschheit,* so well executed that Cousin signalized it as *le début d'un grand écrivain.* From this early period dates his intimate friendship with Michelet (q.v.), the result of a community of feeling and belief. Quinet was a member of the scientific commission sent to the Morea in 1828, and while there, gathered materials for his *Grèce Moderne et ses Rapports avec l'Antiquité* (Par. 1830). Although his political enthusiasm was extremely ardent, he continued unabated his literary labors, and became a contributor to the *Revue des Deux Mondes,* in which *Ahasuerus,* perhaps his finest work, first appeared. From 1839 to 1842 he held the chair of foreign literature at Lyon, where his lectures on the ancient civilizations excited a profound interest. From this situation he passed to the chair of *Littératures Méridionales* at the college of France, expressly instituted for him by M. Villemain; and here, in company with Michelet, he assailed the Jesuits with a keen, earnest, epigrammatic eloquence that startled the chiefs of that body, and made even the government nervous, who knew the peril of being exposed to their secret hostility. In 1846 Quinet was silenced. He threw himself eagerly into the reform agitation that brought about the revolution of 1848, and was elected a member of the constituent and legislative assemblies, where he always voted with the extreme left; but was expelled from France after Dec. 2. On the fall of the empire Quinet returned to France, and was reinstalled in his chair at the college of France, Nov., 1870. In 1871 he was elected a member of the assembly. He died in 1875. Among his chief works are *Allemagne et Italie* (1839); *Histoire de la Poésie Epique* (1836–37); *Le Génie des Religions* (1842); *Les Jésuites,* along with Michelet (1843); *Les Révolutions d'Italie* (1848); *Merlin l'Enchanteur* (1860); *La Campagne de* 1815 (1862). An edition of Quinet's *Œuvres Complètes* appeared in 1878.

QUI'NIA, or QUININE, and the other CINCHONA ALKALOIDS. In the barks of the different varieties of *cinchona* which are employed in the treatment of disease, several alkaloids or organic bases occur in combination with quinic and quinotannic acids. Of these bases, the most important are quinia and cinchonia, each of which is accompanied by (or connected with) two isomeric bases, termed respectively *quinidine* and *quinicine*, and *cinchonidine* and *cinchonicine;* and besides these, a base termed *aricine* or *cinchovatine* occurs in the bark of *cinchona ovata.* We shall describe (1) the *chemical characters,* and (2) the *therapeutic action* of these alkaloids.

1. *Quinia* ($C_{40}H_{24}N_2O_4$) is characterized by the following properties: It crystallizes with 6 atoms of water, in the form of silky needles, from an ethereal or alcoholic solution allowed to evaporate spontaneously in a cool place; but when thrown down from acid solutions, it forms a white curdy precipitate. It is comparatively insoluble in water, requiring about 200 parts of boiling water for its solution, but dissolves readily in alcohol and in ether, and in water acidulated with a mineral acid. It has an intensely bitter taste, which is chiefly perceived at the back of the mouth; it has a well-marked alkaline reaction. It combines with acids, and forms both neutral and acid salts, most of which are capable of crystallization, and all of which possess its own bitter taste. Of these salts the acid ones are far the most soluble.

The most important of its salts is the *neutral sulphate*, represented by the formula $C_{40}H_{24}N_2O_4$, $HO,SO_3 + 7$ Aq. (It was formerly termed the disulphate, till Strecker showed that the correct formula for quinia was $C_{40}H_{24}N_2O_4$; and not $C_{20}H_{12}NO_2$.) It crystallizes in long snow-white silky needles, sparingly soluble in water (yet imparting to it a peculiar bluish tint), but dissolving freely in diluted sulphuric acid and in alcohol. The *acid sulphate*, $C_{40}H_{24}N_2O_4$, $2(HO,SO_3)$, is also crystallizable, and the crystals, when dried for some time at a temperature of 212°, are phosphorescent. Its solution, or an acidulated solution of the former salt, exhibits the phenomena of *fluorescence* (q.v.), in a striking manner. On heating a solution of sulphate of quinia with strong acetic acid, and adding, drop by drop, an alcoholic solution of iodine to the hot solution, we obtain crystals of a compound represented by the formula $C_{40}H_{24}N_2O_4I,2(HO,SO_3) + 10$ Aq. These crystals, which are formed in large flat rectangular plates, present very remarkable optical properties, polarizing light as perfectly as plates of tourmaline.

This alkaloid may be obtained from several species of cinchona, but is most abundant in the yellow bark (*C cardifolia*). The pulverized bark is boiled with water containing 1 per cent of oil of vitriol, which dissolves the bases that are present: the solution is precipitated by carbonate of soda, and the quinia (with the other alkaloids) extracted from the precipitate by ether. For various methods of obtaining the sulphate of quinia on a large scale for medicinal purposes, we must refer the reader to Pereira's *Materia Medica*, 4th edition, vol. ii. part 2, pp. 147–149, and the *British Pharmacopœia*, p. 315. The mother liquid from which sulphate of quinia has been obtained, contains a considerable quantity of a resinous amorphous substance known as *quinoidine*, which, when treated with ether, yields crystals of *quinidine* ($C_{40}H_{24}N_2O_4 + 4$Aq), a base isomeric with quinia, from which again is derived another isomeric base, *quinicine*.

Cinchonia ($C_{40}H_{24}N_2O_2$) crystallizes in comparatively large quadrilateral prisms, which are anhydrous. It is less soluble in alcohol than quinia, and is insoluble in ether, and this difference of solubility affords the means of separating these two alkaloids. With acids it forms two series of salts similar to, but more soluble than, those of quinia. These salts are intensely bitter, and possess (although in a less powerful degree) the same therapeutic properties as those of quinia. In certain varieties of cinchona bark, a crystalline alkaloid named *cinchonidine*, isomeric with cinchonia, occurs. On exposing its salts, or those of cinchonia, to a high temperature, corresponding salts of *cinchonicine* are formed. The last-named substance has the same composition as the two preceding ones, and is precipitated from its salts in the form of a resinous mass. Cinchonia and its isomeric allies are most abundant in the pale Peruvian bark (*cinchonia condaminia*). The method of obtaining cinchonia is precisely the same as that for obtaining quinia. When both bases are present, they may be separated by converting them into sulphates; the salt of quinia is the least soluble, and crystallizes first.

The relations of the above-described alkaloids to polarized light have been carefully studied by Pasteur, and are very remarkable. Their respective effects on the plane of polarization are as follows: Quinia produces a powerful left-handed rotation; quinidine produces a powerful right-handed rotation; quinicine produces a feeble right-handed rotation; cinchonia produces a powerful right-handed rotation; cinchonidine produces a powerful left-handed rotation; cinchonicine produces a feeble right-handed rotation. The action of these alkaloids thus affords an excellent illustration of the importance of circular polarization as an aid to chemical analysis.*

2. The only preparations of the above-described alkaloids included in the *British Pharmacopœia* are the *sulphate of quinia*, the *compound tincture of quinia* (which is merely a solution of the sulphate in tincture of orange-peel in the proportion of one grain to a fluid dram), and the *citrate of iron and quinia.* Sulphate of quinia is a preparation

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*** MM. de Vry and Alluard published some time ago a *Report*, in which they state that the polaroscope reveals the presence of impurities in quinia when too small to be detected by any chemical process.**

which, from its expense (about 12 shillings an ounce), is always liable to adulteration; and specimens containing gypsum, chalk, magnesia, gum, starch, boracic and stearic acids, sugar, salicine, and sulphate of cinchonia, are not unfrequently met with. The first five may be detected by their insolubility in alcohol; boracic acid by the green tinge which it gives to the alcoholic flame; stearic acid by its insolubility in dilute acids; sugar by its solubility in cold water; salicine by the addition of oil of vitriol, which turns it red; and the sulphate of cinchonia by precipitating the suspected specimens by liquor ammoniæ, and then adding ether, when the quinia will be dissolved, but the cinchonia will float between the two liquids. (This test for cinchonia is recommended by the French government, who refuse to allow the sale of sulphate of quinia containing more than three per cent of cinchonia.) The most important use of sulphate of quinia is in the treatment of intermittent fever, for which it may be regarded as a specific. Various nervous affections, especially if they assume a periodical character, are successfully treated by it—as, for example, neuralgia, chorea, certain forms of headache, etc. In numerous forms of dyspepsia, debility, and cachexia there is no single remedy more effectual than the citrate of iron and quinia. The ordinary dose of the sulphate is from one to three grains, but in ague it may be given in far larger doses.* It may be prescribed in the form of pills made with conserve of roses, or as mixture, in which case a little sulphuric acid should be added to render it soluble. In large doses, as from 10 to 20 grains or more, it excites the nervous system, giving rise to headache, buzzing of the ears, blindness, giddiness—a group of symptoms collectively known as *quininism;* and several deaths are recorded as arising from its administration in excessive doses. The average dose of the citrate of iron and quinia is 5 grains, which may be given in a glass of sherry. *Quinoidine* (also termed *amorphous quinine*) seems to be as efficient a tonic as sulphate of quinia, but not to have so great an anti-periodic power, and hence not to be so serviceable in intermittent fever, etc. *Quinidine* possesses the medicinal properties of quinia. Pereira and other physicians have found that its sulphate is equally serviceable with that of quinia, both as a tonic and a febrifuge; and the action of *quinicine* is similar to that of quinoidine. *Cinchonia* appears to act precisely the same as quinia, while *cinchonidine* and *cinchonicine* are of little therapeutic value.

Quinia is employed not merely in the cure of disease, but for the preservation of the health, when the system is exposed to certain noxious influences. Its value as a means of guarding the system from the attack of intermittent fever is so generally recognized, that our admiralty regulations require that every man should take quinia when the ship is within a certain distance of the e. and w. coast of Africa, and that it should be regularly continued in eight-grain doses every morning to those engaged in boat-cruising along the coasts or on the rivers or creeks. The author of *A Visit to the Cities and Camps of the Confederate States*, in *Blackwood's Magazine* for Jan., 1865, observes, that formerly it was considered certain death to sleep out for one night on James's island, opposite Charleston, during the malaria season; when he wrote, thousands of men were quartered on it. In 1863, when the taking of quinia was optional, there was a great deal of fever; in 1864, all were compelled to take their dose regularly every morning, and they were very healthy. It would appear, however, that quinia is not equally efficacious in guarding the system against all forms of intermittent fever, for Mr. Meller, surgeon-naturalist in medical charge of Dr. Livingstone's Zambesi expedition, found a glass of rum given at sunrise to be "a far better prophylactic" than quinia in the fever of e. central Africa.

QUINISEXT (Lat. *quinque*, five, and *sex*, six), the name given to a council which, being regarded as a sort of supplement of the fifth and sixth generals, is called by a title which appears to combine both. In the same view, it is called by the Greeks *penthekte* (from *pente*, five, and *hecte*, sixth). The fifth general council, held in 553, on the subject of the three chapters (q.v.), enacted no canons of discipline. In like manner the sixth, held against the Monothelites in 680, was confined almost entirely to doctrinal decisions. In order to supply the want, a numerous body of bishops, 211 in number, assembled in 692, in a hall of the imperial palace at Constantinople, called the Trullus. It was a purely oriental council, and not only was not approved by the western church and the pope, but was almost immediately reprobated. Its decrees are purely disciplinary; and it is chiefly important as being the council in which was laid down the broad distinction between the legislation of the east and that of the west on the subject of clerical celibacy. The quinisext council, while prohibiting the marriage of any one who is in priest's orders, permits a married man to receive after marriage the order of subdeacon, deacon, or priest, but not of bishop. Against this the Roman pontiffs vigorously protested. Another peculiar canon of this synod (57th) prohibits fasting on Saturday, even though in Lent. On these and other points of difference in discipline no agreement has taken place between the churches down to the present time.

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* Mr. Desvignes (in a *Memoir* communicated on Jan. 10, 1865, to the royal medical and chirurgical society) advocates the administration of solutions of quinia by subcutaneous injection. The solution he employed was a grain and a half in 15 drops of water, acidulated with a drop of dilute nitric acid. With this he successfully treated several hundred cases of intermittent fever in the district of Tuscany, known as the "Maremma," in many of which the use of quinia and arsenic, administered in the ordinary way, had failed to effect a cure.

QUINOA, *Chenopodium Quinoa*, an annual plant, a native of Chili and the high tableland of Mexico. It much resembles some of the British species of *chenopodium* (q.v.), has an erect stem, with ovate, angulate-toothed leaves, the younger ones pulverulent, and panicles much crowded and branched. In the countries in which it is indigenous, it is much cultivated for its seeds, which form the principal food of the inhabitants. The meal made from some varieties of the seed has a somewhat peculiar flavor, but it is very nutritious. Quinoa meal resembles that of oats in not becoming elastic and tenacious when mixed with water, and like oatmeal, can only be made into cakes, not into leavened bread. The plant is sometimes cultivated in our gardens for its leaves, which are a good substitute for spinach.

QUINOLINE. See Leucol, *ante*.

QUINQUAGES'IMA SUNDAY (Lat. fiftieth), the Sunday immediately preceding Ash-Wednesday.

QUINQUEN'NIAL PRESCRIPTION, a period of five years allowed by the law of Scotland within which payment of sums on all bargains concerning movables, arrears of rent in some leases, multures, ministers' stipends, arrestments, must be enforced.

QUIN'QUEREMES, vessels with five banks of oars, however arranged (see Trireme), may be regarded as the first-rates of the ancient navies. The Greek states used them after the death of Alexander, and the Carthaginians a little later. A Carthaginian vessel of this class served during the first Punic war as a model to the Romans, who built 100 on the coast of Bruttii in the year 266 B.C., and thenceforward maintained fleets of such ships. According to Polybius, a quinquereme carried 300 seamen and 120 soldiers.

QUIN'SY, or Common Inflammatory Sore Throat, known also as Cynanche Tonsilaris and Tonsilitis, is an inflammatory affection of the substance of the tonsils (q.v.). The inflammation is, however, seldom limited to these glands, but extends to the uvula, the soft palate, the pharynx, and not unfrequently the salivary glands. The disease usually manifests itself by difficulty in swallowing, and a sense of heat and discomfort in the throat, often amounting to considerable pain. On examination the throat at first exhibits unnatural redness, with enlargement of one or both tonsils. The uvula is enlarged and elongated; its end either dropping down into the pharynx, and by exciting the sensation of a foreign body, giving rise to much irritation, or else adhering to one of the tonsils. The tongue is usually furred, and the pulse rapid, and there are the ordinary symptoms of that form of constitutional disturbance known as inflammatory fever. The inflammation terminates either in resolution (if the attack is not severe, and yields readily to treatment) or in suppuration, which may be detected by the occurrence of slight rigors, and by the increased softness of the enlarged tonsil. The matter which is discharged has a very fetid smell, and the fetor is often the first indication of the rupture. The pain almost entirely ceases with the discharge of matter, and recovery is then rapid. The disease is usually at its height in about a week after the manifestation of the first symptoms, and it almost invariably terminates favorably. The ordinary exciting cause of this disease is exposure to cold, especially when the body is warm and perspiring; and certain persons (or even families) are so subject to it that slight exposure is almost sure to induce it.

The disease may sometimes be cut short if, at its very commencement, a sharp purgative (as, for example, compound infusion of senna with Epsom salts) be administered, followed up almost immediately by an emetic of a scruple of ipecacuanha with a grain of tartar emetic. The patient should remain in the house (or in cold weather, even in bed), and should be kept on low non-stimulating diet. A stimulating liniment, such as the compound camphor liniment, should be applied to the outside of the throat, and the neck should be surrounded with a piece of flannel. In mild cases the above described treatment is sufficient. In more severe cases the patient may gargle frequently with hot water, or milk and water, or, which is better, may inhale the vapor of boiling water. Blistering and leeching will sometimes give relief, but if suppuration is once established, they do harm rather than good. If the tonsils are very much enlarged they should be pricked with a lancet made expressly for the purpose.

Dr. Trench, in his *English Past and Present*, gives quinsy (or quinsey, as he spells it) as an example of the gradual recasting of a foreign word into a new English mold. The Greek word *cynanche* was the origin of the French *esquinancie*, which entered the English language as *squinancy*, became *squinzey* in the time of Jeremy Taylor, and has now softened down to *quinsy* or *quinsey*.

QUINT, Alonzo Hall, D.D., b. N. H., 1828; graduated at Dartmouth college in 1846, and Andover theological seminary in 1852; was pastor of a Congregational church at Roxbury, Mass., 1853–63; in the Massachusetts board of education, 1855–61; chaplain of the 2d Massachusetts volunteers, 1861–64. After the war he became pastor of the North Congregational church, New Bedford. He is a vigorous and interesting writer, and has published *Army Notes* and *History of the Second Massachusetts Regiment;* was editor of the *Congregational Quarterly*, and has written frequently for religious periodicals. He was one of the most prominent army chaplains in the war. As a statistician and genealogist he ranks high; the Congregational churches owe much to his skill and industry in the former relation. He is now engaged in preaching and in literary work, near Boston.

QUINTAL, a French weight corresponding to the English "hundred-weight," was equal to 100 pounds (livres); on the introduction of the metrical system, the same name was employed to designate a weight of 100 kilograms (see METRIC SYSTEM). The metrical quintal is thus more than twice as heavy as the old one, and is equivalent to 220 lbs. avoirdupois.

QUINTANA, MANUEL JOSÉ, surnamed the "Spanish Tyrtæus," was b. at Madrid, April 11, 1772, studied at Salamanca, and established himself as an advocate in his native city, where his house became a resort of the advanced liberals of the time. Among his earliest productions were his *Odes*, which gave him a place in the first rank of Spanish poets. On the outbreak of the war of independence, he made good use of his lyric gift to stimulate the patriotism of his countrymen, and otherwise distinguished himself as editor of the *Semenario Patriotico*, and author of the manifestoes of the insurrectionary juntos, and of most of the official statements of the first Cortes. Meanwhile, he did not abandon literature, properly so called. Besides his Spanish Plutarch (*Vidas de los Españoles Celebres*, Madr. 1808–34), a work which is reckoned one of the finest Spanish classics, he published one or two tragedies, and an excellent selection of Castilian poetry (*Poesias Selectas Castillanas*, 8 vols. Madr. 1808). On the restoration of Ferdinand VII. in 1814, Quintana's liberalism caused his imprisonment for six years. On his release in 1820 he was received in Madrid with acclamations, and appointed president of public instruction. But his enthusiasm in the cause of liberty was now considerably quenched, and in its place appeared a spirit of subservience to royalty which greatly detracted from his previously patriotic character. In 1835 he was reappointed director-general of public instruction, an office which he held till 1851. He was also made a peer and a senator, and acted as tutor to the young queen Isabella from 1840 to 1843. On Mar. 25, 1855, Quintana was honored with a public ovation in Madrid, had a speech made to him by the cortes, and a crown of golden laurel placed on his brows by the hand of Isabella herself. He died Mar. 11, 1857. Quintana's works are to be found collected in the *Biblioteca de Autores Españoles* of Rivadeneyra (Madr. 1852).—See Kennedy's *Modern Poets of Spain*, and Ticknor's *History of Spanish Literature*.

QUINTARD, CHARLES TODD, D.D., LL.D., b. Conn.; took medical degree at the university of New York in 1846; became physician of the New York dispensary in 1847; professor of physiology and anatomy in the Memphis medical college in 1851; ordained in the Protestant Episcopal church in 1855; became rector of the Church of the Advent in Nashville in 1858; consecrated bishop of Tennessee in 1865. He is the author of *A Plain Tract on Confirmation; A Preparation for Confirmation*. In early life he contributed to medical periodicals. He was a strong secessionist and a chaplain in the rebel army.

QUINTES'SENCE (Lat. *quinta*, fifth, *essentia*, essence) signifies literally the fifth essence. The word is of ancient origin, and dates from the time when it was generally believed that the simple elements or constituents of bodies were *four* in number, viz., fire, air, earth, and water, and that earth was the lowest element, being grosser than water, water than air, and air than fire. Some Pythagorean philosophers, not satisfied that these four elements or essences sufficed for the composition of all substances in nature, added to them a fifth element or essence, *ether*, which was supposed to be more subtle and pure than fire (the highest of the four), and was therefore located in the uppermost regions of the sky. The word "quintessence" has thus come down to us in the signification of the most subtle ingredient or extract of any body, though in ordinary language it is employed in a figurative sense. See ALCHEMY.

QUINTET, a musical composition for five voices, or for five instruments, each of which is *obligato*. The most remarkable quintets for stringed instruments are those of Boccherini, Mozart, Beethoven, and Onslow; and for wind instruments (the flute, obeo, clarionet, horn, and bassoon), those of Reicha.

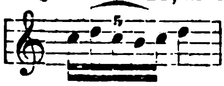
QUINTILIAN (QUINTILIANUS, M. FABIUS) was b. 40 A.D., at Calagurris (the modern Calahorra) in Spain, and attended in Rome the prelections of Domitius Afer, who died 59. After this date, however, he revisited Spain, whence he returned in 68 to Rome, in the train of Galba, and began to practice as an advocate, in which capacity his reputation became considerable. He was more distinguished, however, as a teacher than as a practitioner of the oratorical art, and his instructions came to be the most eagerly sought after among all his contemporaries, while among his pupils he numbered Pliny the younger and the two grand nephews of Domitian. As a mark of the emperor's favor he was invested with the insignia and title of consul; while he also holds the distinction of being the first public teacher who benefited by the endowment of Vespasian and received a fixed salary from the imperial exchequer. His professional career as a teacher of eloquence, commencing probably with 69, extended over a period of 20 years, after which he retired into private life, and died probably about 118. The reputation of Quintilian in modern times is based on his great work entitled *De Institutione Oratoria Libri XII.*, a complete system of rhetoric, which he dedicates to his friend Marcellus Victorius, himself a court favorite and orator of distinction. It was written (as he tells us in his preface to his bookseller Trypho) after he had ceased to be a public teacher;

and was the fruit of two years' labor. During its composition, however, he was still acting, in the lifetime of Domitian, as tutor to the grand-nephews of that emperor. In the first book, he discusses the preliminary training through which a youth must pass before he can begin those studies which are requisite for the orator, and he gives us an elaborate outline of the mode in which children should be educated in the interval between the nursery and the final instructions of the grammarian. The second book treats of the first principles of rhetoric, and contains an inquiry into the essential nature of the art. The subjects of the five following books are invention and arrangement; while those of the eighth, ninth, tenth, and eleventh are composition (embracing the proper use of figures of speech) and delivery. The last, and, in the author's view, the most important, book is devoted to the various requisites for the formation of a finished orator, such as his manners, his moral character, his mode of undertaking, preparing, and conducting causes, the style of eloquence most advantageous to adopt, the age at which pleading should be begun, and at which it should be left off, and other allied topics. The entire work is remarkable for its sound critical judgments, its purity of taste, and the perfect familiarity it exhibits with the literature of oratory. The condensed survey of Greek and Roman literature with which the tenth book commences, has always been admired for its correctness and animation. The declamations, amounting to 164, which have been ascribed to him, are now believed to be spurious, as they evidently belong to different authors, and even different epochs. There is better ground, however, for ascribing to him the anonymous *Dialogus de Oratoribus*, often included in editions of Tacitus. The best editions of Quintilian are those of Burmann (Leyden, 1720); and of Spalding and Zumpt (Leip. 1798–1829).

QUINTIN MATSYS, a celebrated painter of the early Flemish school. He was b. at Antwerp about 1460, and is generally known by the name of the blacksmith of Antwerp, from having followed that trade in early life. The romantic story so long connected with this artist's name, of his having adopted the profession of painting in order to obtain the hand of a painter's daughter, is founded on nothing more authentic than the verses of Lampsonius, affixed to his portrait by Jerome Cock (1510–70), and the inscription on his monument in the cathedral at Antwerp, "Connubialis Amor de Mulcibere fecit Apellem." The fact of his admission into the painters' fraternity of St. Luke in 1491–92, is proved by an entry in the register of that body. It appears from two authentic documents that he was alive on July 8, 1530, but had died previous to Oct. 12, 1531. In the works of this distinguished painter, art is exhibited as transitionary between the style of Van Eyck and Rubens—his aim being, without neglecting the accessory details, to give more importance to the human figure, and more unity and effect to the general composition of his picture. Albert Dürer and Holbein thought highly of his works; among them, the best is an altar-piece with two folding-doors or wings, at one time in the cathedral, now in the picture-gallery at Antwerp, and one of the *chefs-d'œuvre* of that collection. It is specially referred to by sir Joshua Reynolds in his Notes on his Tour through Flanders and Holland. Quintin Matsys was on intimate terms with Erasmus, sir Thomas More, and Petrus Ægidius. Many elaborate specimens of ornamental iron-work are attributed to this artist; but from the facts connected with his career as a painter, it may be inferred that he merely furnished designs for the works in iron referred to.

QUINTIN, or QUINTAINE, was an instrument used in the ancient practice of tilting on horseback with the lance. It consisted of an upright post, surmounted by a cross-bar turning on a pivot, which had at one end a flat board, at the other a bag of sand. The object of the tilter was to strike the board at such speed that the rider was past before the bag of sand, as it whirled round, could hit him on the back.

QUINTUPLET, in music, a rhythmical group of five notes, formed of a note divided into five instead of its proper complement of four parts; the five notes having collectively the value usually expressed by four such notes. Thus, the five semiquavers of the group are equivalent in value to one crotchet, or four ordinary semiquavers.



QUIN'TUS CUR'TIUS RU'FUS, the Roman historian, flourished probably in the time of Vespasian; while a less plausible conjecture represents him as having lived in the reign of Constantine. Nothing further is known or can even be fairly surmised regarding his life. His work entitled *De Rebus Gestis Alexandri Magni Regis Macedonum* consisted of ten books; but of these the first two are lost, and the other eight are occasionally imperfect. Its style is flowing and ornate, but it wants the pure Latinity of Cicero, and the simplicity of Cæsar. Along with the Greek history of Arrian, it forms our most valuable source of information respecting the military career of Alexander the great, although it is not entirely free from geographical, chronological, and strategical blunders. The best edition is that of Zumpt (Brunswick, 1849).

QUIRE (*Fr. cahier*) of paper, consists of twenty-four sheets, each doubled once, and one placed within the other.

QUIRI'NUS was, among the Sabines (and according to Mommsen, among the Latins also), a surname of Mars, and is probably derived from the Latin word *quiris*, a spear. It is therefore equivalent to the "spear-bearer." According to the ancient legend, the name was first given to Romulus (q.v.), as the son of Mars, after his apotheosis, and the festival instituted in his honor was called the *Quirinalia*.—The QUIRINAL (Lat. *Collis Quirinalis*) is one of the seven hills on which ancient Rome stood, and, next to the Palatine and Capitoline, the oldest and most famous quarter of the city. It lies due n. of the Palatine, and its western slope looks down on the Campus Martius, which stretches from its base to the banks of the Tiber. According to the ancient legend, it was the seat of the Sabine portion of the mixed population of early Rome; but this idea is strongly combated by Mommsen, who rejects as a "baseless speculation" the "etymologico-historical hypothesis started by Varro, and, as usual, unanimously echoed by Latin writers, that the Latin *quiris* and *Quirinus* are akin to the Sabine town *Cures*, and that the Quirinal Hill accordingly had been peopled from Cures" (*History of Rome*, vol. i.). The most notable structures on the Quirinal were *the temple of Quirinus*, said to have been built by Numa in honor of Romulus, *the temples of Flora, Salus, Fortuna, and Sol*. Here, also, were the famous gardens of Sallust (*Horti Sallustiani*), the *circus Floræ*, the *circus Sallustii*, the baths of Diocletian, and the Prætorian camp.

QUIRI'TES (probably from *quiris*, the Sabine name for a spear), the collective name of the Romans in their civil relations, while in their military and political capacity they were known as Romani. The title dates back to the time of Romulus, when a large part of the Sabines having united themselves with the Romans, out of compliment to them the Roman *citizens* were given the Sabine name of Quirites. This is Livy's explanation, but the modern theory is more probable, that the Quirites was the original name of the Sabine tribe, and that the new nation was called indifferently by the name of either of its component parts. A distinction, however, gradually crept in as to the use of the term Quirites, and while always a title of honor as applied to the Roman citizens, and so used in all public speeches and addresses, in the army it became a term of reproach, implying that he to whom it was given was no true soldier, but fit only for a civilian.

QUIRK, a small angle or recess between moldings. It is much used in Greek and Gothic architecture, and sometimes in Roman.

QUIS'CALUS, a genus of birds of the family *sturnidæ*, having the tail longer than in the starlings (*sturnus*), and *graduated*—the middle feathers longest—its sides turned up. From this last character, some of the species are often called BOAT-TAIL. The great boat-tail, or great crow blackbird (*Q. major*), a bird about 16 or 17 in. long, is common in the southern parts of North America.—More common, and indeed abundant in all parts of the United States, is the PURPLE GRAKLE, or CROW BLACKBIRD (*Q. versicolor*), a bird about 12 in. in length, tail included; black, with reflections of blue, violet, etc. Vast flocks of this species are to be seen at the seasons of migration in some parts of North America. Its migrations extend to very northern regions in summer. It is to be found in Louisiana at all seasons. Its depredations in fields of maize and other kinds of grain, make it an object of especial dislike to North American farmers. Its flesh is dry and coarse, although often used for food; but its eggs are esteemed a delicacy.

QUITCH. See COUCH GRASS.

QUI TAM actions are actions so called in the law of England from the first words of the old form of declaration by which informers sue for penalties, the plaintiff describing himself as suing as well for the crown as for himself, the penalty being divided between himself and the crown.

QUITCLAIM, in law, a conveyance with both words of grant and release; a deed in the nature of a release. It indicates either an existing estate, or a previous conveyance, and though regarded as a conveyance at common law, is held in some of the states to be an original conveyance. The word is, however, employed constantly in American law, with the same meaning as a release in the law of England. It derives its effect from the words "remise, release, and forever quitclaim."

QUITMAN, a co. in w. Georgia, adjoining Alabama, drained by Chattahoochie river and Pataula creek; traversed by the Southwestern railroad; about 205 sq.m.; pop. '80, 4,392—4,386 of American birth. The surface is level, and heavily timbered. The soil is fertile. The principal productions are corn and cotton. Co. seat, Georgetown.

QUITMAN, JOHN ANTHONY, LL.D., 1799-1858; b. N.Y.; tutor at Hartwick academy, near Cooperstown, in 1815; professor of English literature at Mount Airy college, Germantown, Penn., in 1817; walked to Chillicothe, Ohio, in 1818, and entered a law office, supporting himself by teaching; afterward a clerk in the U. S. land office, Delaware, Ohio, and admitted to the bar. In 1821 he removed to Natchez, Miss.; was elected in 1827 member of the legislature, and became prominent in the politics of the state; chancellor of the superior court 1828-31 and 1832-34. In 1834 he was chosen president of the state senate. In 1836, withdrawing from political life, he went with a small party to assist the Texans in their struggle for independence. On the capture of Santa Anna he returned to Natchez, resumed his law practice, and filled several important public positions, besides superintending large sugar and cotton plantations. In 1839 he visited Europe, and on his return was appointed judge of the high court of errors and appeals. In July, 1846, he was appointed by president Polk brig.gen. of volunteers in the U. S. army; distinguished himself at Monterey by a successful attack on fort Tenerice; commanded at the siege of Vera Cruz, and after the battle of Cerro Gordo was part of the advance under gen. Worth that took the city of Pueblo. He was brevetted maj.gen. for gallantry at Monterey, and received a sword from congress. He distinguished himself at Chapultepec and the Belen gate, and was appointed by gen. Scott governor of the city of Mexico. In 1850 he was elected governor of Mississippi. He was charged with combining with gen. Lopez to organize an expedition to Cuba; but evidence for the prosecution was lacking. In 1855 he was chosen to congress, and in 1857 re-elected, being put at the head of the military committee. He was prominent in debate, and a decided adherent of Calhoun and his political doctrines.

QUI'TO, the capital of Ecuador (q.v.), and of the province of Pichincha, stands between two parallel ranges of the Andes, on the e. side of the volcano of Pichincha (q.v.), at an elevation of 9,492 ft. above the sea, and in lat. 0° 15' s., long. 78° 45' w. Its site, in the midst of mountains, is very uneven; its appearance, however, is picturesque, and its beautiful environment of mountains, together with its clear, healthy, and temperate climate, averaging 60° Fahr., and described as an eternal spring, make it one of the most charming cities of South America. From the hills in the vicinity, a beautiful panoramic view, embracing eight icy peaks of the Andes, may be obtained; and to the s. of the city extends the lovely valley of Chillo, laid out in gardens. The chief edifices are built of stone, the others of adobes, or sun-dried bricks, covered with tiles. Quito contains many churches, monasteries, convents, two hospitals, two colleges, and several plazas or squares. By the earthquake of Mar., 1859, most of the then existing churches, convents, and government buildings, as well as many private residences, were thrown down, property to the value $3,000,000 was destroyed, and many lives lost. From this calamity, the city has in great part recovered. Quito is the seat of the only archbishop in the country, and of the government. Coarse cotton and woolen goods and jewelry are manufactured, and the trade in grain, indigo, metals, and liquors is extensive. Pop. 76,000.

The most important events in the history of Quito are mentioned in the articles Ecuador and Peru (q.v.).

QUIT RENT is the small rent which is payable by the tenants of old manors, by which they go *quiet* and free. In old records, it is called *white* rent, because it was paid in silver money, as distinguished from corn rents.

QUIT'TOR. See QUILTOR, *ante*.

QUOIN (Fr. *coigne*, from Lat. *cuneus* = Gr. *gonia*) is generally a wedge or an angle. In artillery, the quoin is a wedge inserted beneath the breech of a gun, for raising or depressing the muzzle. The Armstrong gun is elevated by a screw instead of a quoin; but considering the rough service of actual warfare, it is doubtful whether the clumsier quoin is not more to be depended on. Quoins on shipboard are wedges used to prevent casks from damaging each other.

QUOIN, in architecture, is one of the stones forming the solid corner of a building. Where the work is of brick or small materials, the quoins are usually of ashlar. They sometimes project, and are molded, when they are called "rustic quoins." See RUSTICATION.

QUOITS, a game much practised by the working classes in the mining districts of Great Britain, seems to have been derived from the ancient game of "throwing the *discus*," which was such a favorite amusement of the Greeks and Romans. The discus was a circular plate of stone or metal, 10 to 12 in. in diameter, and was held by its further edge with the right hand, so as to lean upon the fore-arm, and was cast with a swing of the arm, aided by a twist of the whole body. It was generally thrown edge foremost, and upward at an angle of 45°, so as to give it as great a range as possible, and the player who threw it farthest was the winner. Similar to this game was the "throwing of the *solos*," a heavy spherical mass of stone or iron, perforated through the center, to admit a rope or thong, by the aid of which it was thrown. In this game also the farthest throw was the successful one. It is still practised by the mountaineers of the Appenzell in Switzerland. The game of quoits differs very considerably from both of these. A quoit is a flattish ring of iron, generally from 8½ to 9½ in. in external diameter, and between 1 and 2 in. in breadth. It is convex on the upper side, and slightly concave on the under, so that the outer edge curves downward, and is sharp enough to stick into the ground. The mode of playing is as follows: Two pins, called "hobs," are driven into the ground from 18 to 24 yards apart; and the players, who are divided into two parties, stand at one hob, and in regular succession throw their quoits (of which each player has two) as near to the other hob as they can. The points are counted as in bowls or in curling. To facilitate the sticking of the quoits at the point where they strike the ground, a "clay end"—that is, a flat circle of clay, about 1 or 2 in. in thickness, and 1½ ft. in radius—is placed round each hob. This requires to be kept moist, and should have sawdust strewed over it. The quoit, when to be thrown, is grasped with the right hand by one side, and pitched with an upward and forward jerk of the hand and arm, which give it a whirling motion, and cause it to strike the ground with its edge. Professional players acquire such dexterity in this game, that they can very frequently "ring" their quoit—that is, land it so that the quoit surrounds the hob.

QUOR'RA. See Niger.

QUO'RUM (Lat. *quorum*, of whom) is a legal term, denoting a certain specified number out of a larger number as entitled or bound to act for certain purposes. Thus, in statutes appointing commissioners or trustees of a public work, it was usual to name a certain number of the whole body as sufficient to discharge the business, when it may be inconvenient for all to attend. In Scotland, the word is commonly used in reference to trustees appointed under trust settlements, when one or two individuals, either in point of number, or for some personal reason, must concur in formal acts. In England, the word is now seldom used except in regard to justices of the peace. It was an ancient practice of the crown to select a few of the justices, generally the most skilled in the law, and designate them as "of the quorum," so as to secure their presence on certain occasions when peculiar business requiring skill was to be done. This selection, however, by degrees came to be considered invidious; and by statutes of George II. and George III., it was expressly enacted that things which formerly required to be done only by justices of the quorum, might be done by ordinary justices. And latterly, the crown has made all the justices justices of the quorum, so as to put them all on the same footing.

QUOTID'IAN FEVER. See Ague.

QUO' WARRANTO is a writ or information issued from the court of queen's bench in Westminster, calling upon a person or body of persons to show by what warrant they exercise a public office or privilege. It is the legal mode of remedying any usurpation of privilege or of office.

R

R, THE eighteenth letter in the English and other western alphabets, is one of the group of liquids. See Letters. Its name in Hebrew was resh, meaning forehead, and the rude outline of a head is thought to be yet recognizable in the Phenician form of the letter. Of all the consonants, R approaches most nearly to the vowels. In Sanskrit, there is an R-vowel distinguished from the R-consonant by a different character. The Greek, also, had two varieties of R, one with the "spiritus asper" (ῥ), or rough breathing, at the beginning of words, and when following another R; and another with the weaker breathing (ῤ) in other positions. The Romans in spelling Greek words represented the former by *rh*, and hence we still write *Rhodes*, *rheumatism*, *catarrh*. This *rh* was probably of the guttural kind commonly called a "burr." This pronunciation of *r* occurs as a peculiarity of individuals everywhere, but it is universal in Northumberland and Durham, and characterizes the pronunciation of the letter in certain positions throughout Germany and Scandinavia. The normal pronunciation of R in English and in the Romanic tongues (and it appears to have been the same in Latin) is a vibratory sound produced by applying the tip of the tongue near the roots of the upper fore-teeth. From the resemblance to the growl of an angry dog, R was called by the ancients the dog's letter. In modern English, there is an increasing tendency to smooth down the roughness of the vibration, until, in such words as *far*, *serf*, *world*, the *r* has dwindled to a kind of nondescript vowel, modifying the preceding vowel. This emasculating process—for such it undoubtedly is—is in so far only the operation of the universal law of phonetic decay, arising from the natural tendency to spend as little energy as possible; but it has been accelerated in this case by a fashion which is apt to mistake languor and indifference for refinement. This affectation goes so far as to turn words like *very*, *rare*, into *vewy*, *waaw*. R is one of the most difficult articulations; children are long in learning it, and some individuals never can pronounce it. Whole nations (e.g., the Chinese and some Polynesian tribes) have no such consonant in their language, using *l* instead. The interchanges of *r* with *l* are noticed under L. A more remarkable substitution is that of *r* for *d*, which was very prevalent in early Latin, as we learn from Priscian and from inscriptions. Ex. *arvocatos* for *advocatos*. The Latin of the literary period had returned from this corruption, except in *arbiter* (from an old verb, *adbitĕre*, to go to, to intervene), *arcesso*, and *meridies* (for *medidies*, from *medius*). The substitution is easily accounted for, when we consider that in both sounds the tongue is applied to the same part of the palate; only in the one it is applied firmly; in the other, loosely, so as to vibrate.

A very common phenomenon, especially in Latin, is the sinking or degradation of an original *s* between two vowels into *r*. On inscriptions we find *Lases*, *asas*, *esum*, for what at a later period was written *Lares*, *aras*, *eram*. *Jus*, *mos*, became in the genitive *juris*, *moris*, instead of *jusis*, *mosis*. Even final *s* was sometimes degraded to *r*, as in the double forms, *arbor* = *arbos*, *honor* = *honos*. Curiously, we know the date when the tendency to change *s* between two vowels into *r* set in; for Cicero remarks that L. Papirius Crassus, who was consul 335 B.C., was the first that was called Papirius, the ancestral name having been Papisius. The interchange in question occurs also to some extent in the Teutonic tongues. Compare Eng. *forlorn* with *lose* (Ger. *verlieren*), *was* with *were*; Ger. *wesen* (to be) with *war* (was); Goth. *hausjan* with Ger. *hören* (to hear); Eng. *hare* with Ger. *hase*. The unstable nature of this articulation is manifested in its frequently changing its place with regard to an adjoining vowel; compare *board* with *broad; bird* with old *brid; grass* with A.-S. *gærs*.

RA. See Egypt.

RAAB, a co. in w. Hungary, drained by the Danube and Raab rivers; about 16 0 sq.m.; pop. about 100,000. The surface is level. The principal productions are corn, wine, and live stock. Capital, Raab.

RAAB (Hung. *Györ*), a t. of Hungary, stands on an extensive plain at the confluence of the Raab and the little Danube, a branch of the great river of that name, 67 m. w.n.w of Buda. It consists of an inner and outer town, is regularly built, and for the most part well paved, but suffers from an insufficient supply of drinking-water. It contains numerous religious edifices, among which is a beautiful cathedral. The manufactures are chiefly tobacco and cutlery; and the trade of the town, favored by its position on the highway between Vienna and Buda, is important both by land and by steamers on the river. Pop. '69, 20,035.

RAAL'TE, a cantonal t. of the Netherlands, in the province of Overyssel, 11 m. n.n.e. of Deventer. Pop. '75, 5,512, of whom one-fourth belong to the reformed church, and the remainder, excepting 61 Jews, to the Roman Catholic. The trade is chiefly in agricultural produce, cattle, wool, wood, and bark for tanning. Raalte is one of the prettiest places in the province, having many beautiful houses, and in the neighborhood, seats of the nobility. Hans Willem, baron van Bentinck, the founder of the ducal house of Portland, was b. at Raalte in 1651.

RAA'SAY, one of the Western isles, belongs to the group of the inner Hebrides, and lies between the isle of Skye and the mainland; the sound of Raasay separating it from the former, and Applecross sound from the latter. It is 18 m. in length by 2¼ m. in greatest breadth. Pop., which is gradually decreasing, was, in '71, 389. The western side of the isle is bare and uninteresting. On the eastern and more sheltered side, there are numerous farms, some patches of plantation, and bold and striking scenery. Brochel castle, on the east shore—now a mere ruin—is the chief object of interest in the island. It is perched on the summit of a lofty cliff, which beetles over the sea, and is entirely inaccessible, save by a pathway winding around the cliff.

RABA'NUS MAGNENTIUS MAURUS, 776–856; b. of French parents in Mentz. Having completed his studies at Fulda in Hesse, he went to Tours and studied under Alcuin, who gave him the surname of Maurus in honor of St. Maurus. In 804 he returned to Fulda, founded the first public convent-school in Germany, and became its head, drawing around him many pupils by his successful teaching; was consecrated abbot in 822, and archbishop of Mentz in 847. He founded the monastery of Mont St. Pierre. He ntroduced a rule that the clergy should preach only in the native tongue. He required also the study of the Greek of the New Testament. Rabanus wrote commentaries on the whole Bible.

RABAT', or Rabatt, a seaport and manufacturing t. in the kingdom of Fez, Morocco, stands at the mouth of the Bu-Regreb, 135 m. s.s.w. of the entrance to the strait of Gibraltar. It is surrounded by walls; protected by batteries, and by a citadel, called *El-Mansur;* and contains numerous mosques, minarets, bazaars, etc. Owing to the silting up of the mouth of the river, the commerce of Rabat has much declined. Manufactures, however, of carpets, bournus, woolen fabrics, waterproofs, mixed linen and silk goods, saddlery, etc., are actively carried on. Rabat was formerly the center of the European trade with Morocco, and it still exports olive oil, wool, grain, oranges, hides, flax, and dye-stuffs, wax, etc. There is a small import of cotton-stuffs, linen, cutlery, glass, sugar, and tea. Value of imports '74, £11,000; of exports, £5,400. Pop. 20,000, of whom 2,000 are Jews.

RABBA, a flourishing t. of Africa, in the kingdom of Gando, stands on the left bank of the Niger, 80 m. above Egga, in lat. 9° 16'. The district by which it is surrounded is beautiful and highly cultivated. Rabba carries on an extensive general trade, and is the most notorious slave-market in this part of Africa. Estimated pop., 40,000.

RABBI (Heb., *My master*), an honorary title of the Jewish masters of the law, which is first found applied after the time of Herod, subsequently to the disputes between the two schools of Shammai (q.v.) and Hillel (q.v.). It was in common use at the time of Christ, who is addressed as such by his disciples and the common people. Other forms of the same title are rab, rabban, rabbon ("rabbuni")—the first, like rabbi, being more a general term for a certain recognized authority, the latter applying more strictly to a head of an academy. The title rabban was first given to the grandson of Hillel, Gamaliel (q.v.), and was only borne by seven other exalted chiefs of schools. Properly speaking, the following dignities alone were of old considered "official": 1. *Sopher*, scribe, one who occupied himself with copying and commenting on the Scriptures, and who, when elected to the sanhedrim (q.v.), received the title of chacham (sage); 2. *Rabban*, nomodidaskalos, one who held popular orations, homiletically or otherwise treating of the law. Out of the number of the regular disciples (talmidim) were chosen the chaberim (colleagues), who, again, were elected to the dignity of a rabbi by the "semichah," or imposition of hands by three members of the sanhedrim. At present nothing but the degree of "morenu," our teacher, bestowed upon a candidate who proves his erudition in the written and oral law and all its bearings before a college of rabbis, is wanted to render him eligible for the post of a rabbi, which, however, carries no authority whatsoever with it, save on a very few ritual points. We need hardly allude to the popular fallacy of the rabbi of our day being a kind of "priest" in the sense of the Old Testament. He is simply the teacher of the young, delivers sermons, assists at marriages and divorces, and the like, and has to decide on some ritual questions. Up to the times of the removal of the "disabilities" in Europe, he had on some occasions also to give judgment in civil matters, in accordance with the "Choshen Mishpat," a legal text-book, derived from the talmudical and post-talmudical authoritative decisions.

RABBIT, *Lepus cuniculus*, an animal of the same genus with the hare, but of smaller size, and with shorter limbs, the hind-legs shorter in proportion. It is not adapted, like hares, to seek safety by rapid and continuous running, but by retreating to burrows, which it excavates with great dexterity. Except in some varieties, which result from domestication, the ears are only about as long as the head. The wild rabbit is of a grayish-brown color, paler or whitish on the under parts; the ears not tipped with black, like those of the common hare; the tail rather larger and more conspicuous—brown above, white beneath. The rabbit exhibits a remarkable difference from the hare in its gregarious habits; and another in the comparatively imperfect state of the young at their birth, which are blind for some days, and are almost destitute of hair. It delights in sandy heaths, dry grounds covered with scattered furze or juniper, and other such situations; to which, however, it is by no means restricted, and is often very troublesome by its depredations on crops in the finest fields, having its abode in some neighboring wood, but it never makes its burrow in a wet soil. Although now very abundant in most parts of Britain, and generally throughout Europe, the rabbit is said to have been introduced into Britain from Spain, and even to have been originally brought to Europe from the n. of Africa. In a wild state the rabbit is monogamous, and the attachment of a pair is said to continue during life; but in a state of domestication, it ceases to pair. The fertility of rabbits is proverbial; they begin to breed when six months old, and are capable of producing several litters in a year, of 4 to 12 or more in a litter; so that, in favorable circumstances, they multiply with prodigious rapidity; and although they have many natural enemies, would in many places become an intolerable pest to farmers, were not means adopted to reduce their numbers. Rabbits often inflict great injury on plantations by barking young trees, seeming to take pleasure in tearing off far more than they can eat. An infusion of tobacco repels them from trees. The flesh of rabbits is in high esteem, and the fur being used for various purposes, rabbit-warrens are found profitable in lands not suited for agriculture. See RABBIT-SKINS.

Instances have occurred of the rabbit and hare breeding together, but they are very rare, and the creatures seem rather to regard one another with antipathy.

Tame rabbits exhibit great variety of colors—gray, brown, reddish-black, more or less mixed with white, and often white with all the characters of albinism. Peculiarities of other kinds also appear in some of the varieties, among which excessively long and drooping ears are one of the most remarkable. *Fancy rabbits* are prized and tended like *fancy pigeons*. But when rabbits are kept for economical purposes, those which differ less widely from the original type are preferred. Rabbits eat almost any kind of vegetable food; the coarser blades of cabbages, turnip-leaves, celery-tops, carrot-tops, and other produce of the garden, not suitable for human use, are readily consumed by them, as well as chick-weed, sow-thistle, dandelion, and many other weeds. With very little trouble, and still less expense, a man can easily secure one or two rabbits a week for his family from the produce of his stock. When the rabbit-inclosure contains a plot of grass and clover, it affords them an important part of their food. Great care is requisite to keep their boxes dry, neglect of which, and a too exclusive feeding with green and succulent food, cause diseases, often fatal, particularly to the young. Dry food, such as corn, ought to be frequently given; and aromatic herbs—such as parsley, thyme, milfoil, etc.—not only tends to preserve the health of rabbits, but to improve the flavor of their flesh. It is usual to give no water to tame rabbits; but it is better to supply them regularly with it, and the females particularly need it after producing young.

The *Angora rabbit* is a remarkable variety, with very long silky hair, which is easily stripped off in summer, and is of considerable value. The rearing of this kind of rabbit is extensively practiced, in some parts of France, in order to the manufacture of gloves, etc.

An old English name for the rabbit is *cony*, and its name in many other languages is similar to this, as Lat. *cuniculus*, Ital. *coniglio*, Ger. *kaninchen*, Welsh *cwningen*; but the rabbit is not the cony (q.v.) of Scripture.

The gray rabbit (*lepus sylvaticus*) of North America is the most plentiful species of the genus *lepus* in New Jersey, Pennsylvania, and the more southern states; but although it somewhat resembles the common rabbit in color, and is rather inferior to it in size, its habits are intermediate between those of the rabbit and of the hare. It does not burrow, although, when hard pressed by a pursuer, it retreats into any accessible hole, and sometimes digs, in order to escape from or enter an inclosure.

RABBITS, in point of law, give rise to many nice questions, which in practical life are of no small importance, for they form a branch of the game-laws (q.v.). In England and Ireland, whoever is owner of the soil is entitled to catch and kill all the rabbits he finds upon it, without any game license; but if he is not the owner or tenant of the lands, nor acting by their express direction or permission, then he must have a license. As between landlord and tenant, the rule is, that unless the lease expressly say that the rabbits shall belong to the landlord, they belong to the tenant, who can kill and catch them at discretion. A tenant, however, though having a right to kill rabbits on his farm, cannot give leave to strangers to come on his farm and enjoy a day's sport there, though nothing but rabbits are killed, the privilege of killing the rabbits being personal to the tenant. Nevertheless, the tenant may employ his servant or a rabbit-catcher to kill the rabbits if they exist in excessive quantities, for in that case he deals with them as vermin. Though rabbits are not game, still they are protected against poachers in precisely the same way; for if any one trespass on land to kill rabbits, he is liable to be fined £5; and he may be arrested, if caught in the act on the lands, and detained, provided he do not tell his name and address, and quit the lands. The rabbits which he has poached cannot, however, be taken from him by any person, except, only, when he is on the highway, and then only by a constable, who suspects he has poached them. In the latter case, viz., where the poacher is stopped on the highway by a constable (and he cannot be stopped by any other person there), he cannot be taken into custody, but merely is liable to be summoned before justices, and fined. Poachers who take rabbits in the night-time now commit an indictable offense, and not merely an offense which justices can punish summarily. There is no close-time as to rabbits, and any person may buy and sell them without any license. In Scotland, the law does not materially differ from that of England as to rabbits, and the tenant is entitled to kill them if there is no express reservation of them to the landlord. Poachers of rabbits are punished summarily in the same way, and constables on highways may stop poachers as in England. The only difference between the law of England and Ireland is, that in Ireland a game license is not required in any case for killing rabbits, whether the lands are the sportsman's own lands or not. See also GAME, POACHING. Paterson's *Game-laws of the United Kingdom.*

RABBIT-SKINS have a regular commercial value in consequence of the hair being well adapted for felting purposes; hence they are collected in large numbers by the chiffoniers of this and other countries, and the hair itself is not unfrequently imported from Holland and Germany under the erroneous name of "cony-wool." Its chief use is in making the bodies of felt hats; and this is now done by machinery of very ingenious construction. It consists of a hollow cone of copper, of the size of the felt-cones required by the hatters. The cone is covered with perforations, and it fits on to a metal shaft of the diameter of its base by means of a collar, which can be turned round by a band, so as to carry the perforated cone with it. At the bottom of the metal shaft is a fan, moved by machinery, which produces a strong downward draft, so that if the hairs are thrown against the cone, they are held tightly by the current of air through the perforations, and as the cone regularly revolves, its outer surface becomes entirely coated with the rabbit-hair. When a sufficient thickness is obtained, the smooth copper cone is easily drawn out, leaving a cone of wool, which is felted by the usual processes of wetting, beating, etc. Another ingenious contrivance in this machine is to make the draught of air caused by the fan blow the rabbit-fur forward to the cone, so as to distribute it with an evenness which could not otherwise be attained.

The skins, after the hair has been removed from them, are sold to the glue-makers, and are used—mixed with shreds of other skins—in the manufacture of glue and size. Besides these uses, the skins of rabbits are dressed as furs, in various ways, to supply the demand for cheap articles; and so skillfully is this branch of trade carried on, that admirable imitations of the rarer and more costly furs are made. Thus, ermine and miniver are made from white rabbit-skins, the black ones furnishing the spots; and the common variety is dressed and dyed various ways, to represent the furs of dark colored animals. In the reign of Henry VIII. rabbit-fur was valued very highly, and was worn by the nobles of the realm; this is referred to in the charter of the Skinners' company.

There has been a very large market in the United States for the imitation furs prepared from rabbit-skins, to which country British manufacturers have largely exported.

RABELAIS, FRANÇOIS, the greatest of French humorists, was born, according to the general statement of biographers, in 1483, but more probably toward 1495, at Chinon, a small town in Touraine. His father, Thomas Rabelais, was proprietor of a farm in the neighborhood, celebrated for the quality of its wine, the sale of which he, perhaps, combined with the business of an apothecary. His prosperous circumstances enabled him to give to his son every advantage of education, and at an early age the boy was sent as a pupil to the neigboring abbey of Seully. His progress in his studies being found by no means satisfactory, he was thence removed to the university of Angers. Here—though as a scholar he still remained quite undistinguished—he was fortunate enough to make the acquaintance of Jean (afterward the celebrated cardinal) Du Bellay, to whose steady and helpful friendship he was subsequently much indebted. At the desire of his father he consented to embrace the monastic state, and, after passing through the preliminary novitiate, became a brother of the order of St. Francis, in the convent of Fontenay le Comte, according to the annalist, Pierre de St. Romuald, in 1511, but the discovery of a document by M. B. Fillon (*Poitou et Vendée*, Fontenay, 1861), renders the date 1519 more probable. Rabelais now devoted himself with the utmost ardor and perseverence to the prosecution of his hitherto neglected studies. Aiming at the widest culture attainable, he ranged the whole circle of the sciences as then understood. To medicine, in particular, he seems to have been strongly attracted; and in the sphere of language, in addition to Latin and Greek, he is said to have attained a competent mastery of Italian, Spanish, German, English, Hebrew, and Arabic. Meantime, with his brother-monks, he was much the reverse of a favorite. They hated him for his devotion to the new learning, and suspected his Greek to be only a cover for heresy. About 1523 a search was made in his cell for suspicious books; the whole were confiscated, and to save himself from further and sharper persecution he fled. But though only a poor monk, the wit and learning of Rabelais had gained him several influential friends, through whose exertions he obtained from pope Clement VII. an indulgence to transfer himself from the order of St. Francis to that of St. Benedict, and became an inmate of the monastery of Maillezais. For the calumny afterward circulated, that his removal was necessitated by the odium attached to a life of profligate indulgence, there seems no reason to suppose that there ever was the smallest ground. We must infer that in his new abode he found himself not much more comfortable than before, as after a few years he quitted it abruptly, without the sanction of his ecclesiastical superiors, thereby incurring the severest censures of the church. But it was not persecution that induced this second flight from the monastic state. It was the incurable aversion of the grotesque humorist to the restraints of the "regular" clergy. And nobody seems to have really blamed him for his professional apostasy—his own bishop, among others, receiving him at his table in the most friendly manner! During 1524–30 he appears to have frequented the universities of Paris and Bourg, which may account for the intimate knowledge of university manners and opinions shown in his great work. In the year 1530 he settled himself at Montpellier, and, taking a medical degree at the university, was appointed to the post of lecturer. In 1532 he went as hospital physician to Lyons, where he published several works on medical science, besides other miscellaneous matter bearing on archæology, jurisprudence, etc. In the beginning of 1534, his old friend, Jean Du Bellay, then bishop of Paris, and shortly after to be cardinal, passed through Lyons on an embassy to Rome, whither, in the capacity of traveling physician, Rabelais was delighted to accompany him, in fulfillment of a desire long cherished. While at Rome he petitioned Paul III. for a remission of the penalties still attached to his misdemeanor before mentioned; and through the interest of Du Bellay and others, a bull was obtained, absolving him and permitting his return to the order of St. Benedict. But he continued the exercise of his profession of medicine at Montpellier and other towns till 1538, when he withdrew as canon into Du Bellay's own abbey of St. Maur des Fosses, near Paris, and resumed his monastic habit. The death of Francis I., in 1547, was followed by the fall of cardinal Du Bellay, the new monarch, Henry II., favoring the cardinal de Lorraine. Rabelais shared for a time in the disgrace of his old protector, whom he appears to have followed to Rome, but his tact and irresistible humor won him friends among the Lorraines, and in 1551 he obtained the curacy of Mendon, in the occupancy of which the remainder of his life was passed. So far as record remains of it, his life here was happy and blameless. He was exemplary in the fulfillment of duty, profuse of charity, sedulous in the relief of suffering, for which his medical knowledge afforded him unusual facilities, and always specially delighted to cultivate, as occasion served, the society of those any way noted as eminent in learning or science. He died at Paris, in 1553, in the Rue des Jardins, in the parish of St. Paul, in the cemetery of which he was buried.

The scientific treatises of Rabelais are—almost in the nature of the case—long since utterly forgotten; but his romance, in which are narrated the wonderful adventures of Gargantua and Pantagruel, continues to take rank as one of the world's masterpieces of humor and grotesque invention. In the form of a sportive and extravagant fiction, it is, in fact, a satirical criticism of the corrupt society of the period, the prevalent follies and vices of which are parodied with surprising effect and ingenuity. The difficulty of its allegorical form, however, and the quantity of recondite allusion it embodies, tend somewhat to impair the effect of the work for most modern readers. Also, it must be said, that in his attempt to

> Cleanse the foul body of the infected world,

it is the whim of the writer to infect himself with not a little of its foulness; and such is the riotous license of the buffoonery, from behind which, as a stalking-horse, he shoots the arrows of wit, that few books are less fitted for general perusal in the present more decorous times. On the publication of his work, the charge of irreligion and atheism was freely preferred against Rabelais, and certain other scandals were circulated, for which there seems to have been in his life no foundation, except as the free tone assumed by the writer might suggest a precarious inference to defective morality in the man. The religious corruptions of the time, and the vices of the priestly class, had formed one favorite theme of his satire, and he simply paid the usual penalty in thus incurring the easy retort calumnious. See Delécluze, *François Rabelais* (Par. 1841), and P. Lacroix, *Rabelais sa Vie et ses Ouvrages* (Par. 1859), in the latter of which works the incidents of his career are for the first time clearly and correctly narrated.

RAB'IES, the name given to a disease affecting the dog and other animals, was known to the ancients, and is spoken of by Aristotle, Pliny, and Horace; but it does not seem to have been then so virulent in its nature, or alarming in its consequences, and Aristotle, perhaps in ignorance, states that man was not subject to its attacks. It was very prevalent on the continent two or three centuries ago, but was comparatively rare in this country until the last century. This malady stands almost alone in this, that all animals seem liable to its attacks.

It is a matter of dispute among some of our best authorities whether rabies be occasionally *spontaneous* in the carnivora—the only animals in which it is undoubtedly inherent—or communicated solely by *inoculation*.

Looking simply at the *history* of the disease, the facts would seem to be against the spontaneity theory. Rabies is not known in some countries, such as the cape of Good Hope, s. Africa, Egypt, Syria, the South Sea islands, Lisbon, where dogs swarm; and in Constantinople, where they go at large, and support themselves on offals of all kinds and qualities, the disease is of very rare occurrence. John Hunter relates that it was not known in Jamaica for 40 years previous to 1783, when it was introduced by an affected dog from America; and Dr. Hamilton says that curs of the most wretched description abound in the island of Madeira—that they are affected with almost every disease, tormented by flies, by heat, thirst, and famine, yet no rabid dog was ever seen there. There is often, no doubt, great difficulty in tracing the cause of rabies from inoculation. The owner may feel convinced that his diseased dog had almost never been out of his sight, or exposed to an affected animal; but when we consider the predatory habits of the dog, and his love of association, and how easily he can steal away unobserved by night or by day for a longer or shorter time, we can readily account for the most vigilant eye being occasionally off its guard. It has been asked, as an objection to the exclusiveness of contagion or inoculation, How was rabies at first originated? But the same difficulty attends the case of small-pox and other diseases which now arise only from contagion.

There is another important peculiarity in this disease on which medical men are divided —viz., whether the virus of a rabid animal, other than of the *carnivorous* species, can communicate the disease. Experiments to test this were made by some foreign surgeons of eminence, by Drs. Vaughan and Babington of London, and at the Royal Veterinary college; and it is reported that in every instance they failed in producing the disease. It is certain, however, that others have not so failed in their object. MM. Majendie and Brechet in 1823 inoculated two dogs with the saliva of a hydrophobic man, and it resulted in one of the dogs becoming rabid, which in turn communicated the disease to other dogs and some sheep. Mr. Earl, the well-known London surgeon, in administering medicine to a hydrophobic woman, was bitten by her, and he immediately excised the bitten part. Being accused of unnecessary fear and cowardice, he determined to justify his fears, and having inoculated rabbits with the woman's saliva, some of them became rabid. Mr. King of Bath succeeded in producing the disease in a common hen by the virus of a cow. Several other cases could be related, but it may serve our purpose to quote the following remarks of Mr. Youatt: "I can imagine that the disease shall not be readily communicated by the saliva of a graminivorous animal; but I have once produced it in the dog with the saliva of an ox, and twice with that of the horse, but I have failed to do it in very many cases. While on this point, it may be remarked, that the writer once saw a rabid horse bite a young man's hand rather severely, while incautiously giving it a ball of medicine, and he accompanied him to sir Astley Cooper, who, according to his invariable practice, as he told us, applied nitrous acid to the injured part, and he assured us that no bad effects would accrue; and neither there did."

We shall briefly notice some of the leading *symptoms* of rabies in the dog and horse. These may be exhibited in the dog in a few days, or it may be, and often is, weeks, and even months after he has been bitten. At first he loses his appetite, becomes sullen, fidgety, has a vacant gaze, licks or gnaws the injured part, laps any liquid that comes in his way—for he has, unlike man, no dislike for water, although he has a difficulty in swallowing it—eats wood, straw, hair, and other indigestible substances; and in a day or two he becomes quarrelsome, bent on mischief, bites at anything that comes in his way, and his bark is more like a howl; his lower jaw often becomes pendulous, and general paralysis sometimes precedes death; and as a rule, on the fifth or sixth day he dies. The principal post-mortem appearances are these—enlargement and increased vascularity of the salivary glands, inflamed condition of the base of the tongue and fauces, epiglottis, and stomach, which last organ almost invariably contains such indigestible substances as straw, hair, offal, etc. The symptoms in the horse, which become apparent in a few weeks, are those of extreme irritability. He trembles, heaves, and paws, staggers and falls; and after a severe struggle, he suddenly rises again, and appears settled and collected, when he will again exhibit the usual distressing symptoms. He is sometimes mischievous, bites, foams, and snorts; and generally in three days he dies paralyzed and exhausted.

The disease seems primarily to be one of *blood-poisoning*, and not, as some have represented it, an affection of the nervous system. We know that some instances of blood-poisoning terminate with coma, or convulsions, but are not, on that account, to be considered as proceeding from nervous disease. Whatever may be the precise nature of the disease, it is certain that no cure has been discovered for it. The writer has seen many dogs, some horses, and an ox in all the different stages of it, and many attempts at a cure tried, without producing even any palliative effects, and every one of the patients died in the ordinary course, whether anything or nothing was done. As the disease is so rare, and—contrary to popular belief—is not more prevalent at one period of the year than another, no anticipatory precautionary measures can be taken. Preventive measures, however, when it is known, or even suspected, that the disease has manifested itself, should not for an instant be neglected. All dogs known to have been bitten, or been in the company of the rabid animal, should be immediately destroyed, and every other dog in the town and district confined, or closely muzzled, for several weeks, or even months. As to the measures to be taken when a human being is bitten by a rabid animal, see HYDROPHOBIA.

RABINET, a small piece of ordnance formerly in use. It weighed but 800 lbs., and fired a small ball of 1¼ in. diameter, with a very limited range.

RABUN, a co. in extreme n.e. Georgia, drained by the Chattooga and Little Tennessee rivers and Tallulah creek; 500 sq.m.; pop. '80, 4,634—4,629 of American birth, 193 colored. The surface is rugged and mountainous; in the s. part are the Tallulah falls, of great beauty, situated in a wild gorge. Corn and pork are the only products. The county is noted as the home of many illicit distillers. Co. seat, Clayton.

RA'CAHOUT, a farinaceous food imported from the Barbary coast, and sometimes recommended, but with questionable judiciousness, to invalids. It is believed to consist of the meal of the acorns of the Barbary oak (*quercus ballota*), flavored with some aromatic herb. It is sometimes sold under its French designation of *racahout des Arabes.* It must not be confounded with tacahout (q.v.).

RACALMU'TO, or RAGALMUTO, a t. of Sicily, in the province of Girgenti, in an inland situation, on the crest of a hill 12 m. n.e. from Girgenti. It is said to be of Saracenic origin. It has a castle built by Frederick Chiaramonte in the 14th century. Pop. '71, 11,012.

RACCONI'GI, a t. in the w. of northern Italy, pleasantly situated on the Maira, 24 m. s. of Turin by railway. Its palace, surrounded by a small but handsomely laid-out park, is one of the country residences of the royal family. Silk fabrics and twist, and woolen cloths, are manufactured. Pop. 8,211.

RACCOON', or RACOON, *Procyon*, a genus of quadrupeds of the bear family, *ursidæ*, but differing widely from the typical members of that family, in being less perfectly plantigrade, the whole sole of the foot being indeed rested on the ground when the animal is still, but being partly raised when it walks, while when running it only touches the ground with the tips of its toes, and moves in a bounding manner. The dentition also differs from that of bears, there being, for one thing, only six instead of seven molars on each side in the lower jaw. The dentition indicates an aptitude both for animal and vegetable food. The general appearance may be described as intermediate between that of a fox and of a bear in miniature. The raccoons are exclusively American. The common raccoon (*P. lotor*) is a native of North America, from Canada to the s. of Mexico. It is about the size of a small fox, grayish-brown; the muzzle white. The hair is of two kinds, an under coat soft and woolly, of a uniform gray; and long and rather stiff hairs projecting through the wool, and alternately marked with black and grayish-white. The raccoon frequents the sea-shore, and the margin of swamps and rivers. It commits great ravages on fields of Indian corn, plantations of sugar-cane, etc., and is not less destructive to poultry. It feeds much on oysters, particularly in the alluvial coast-lands of Carolina and neighboring regions where the American oyster abounds on the banks of rivers and creeks, and exhibits great dexterity in opening oysters. It is also very fond of crabs and other crustaceans. It has a curious habit of dipping or washing its food in water, whence its specific name *lotor* (Lat. washer). When pursued, it often takes refuge in a tree, climbing with great agility, but its destruction is then considered sure, whence the American proverbial reference to a *tree'd 'coon*. The fur of the raccoon is used in the manufacture of hats, and is a considerable article of commerce.—Another species, the CRAB-EATING RACCOON (*P. cancrivorus*), the crab-dog of Guiana, is found in all parts of South America e. of the Andes. It is rather larger than the common raccoon, although very similar to it.—Both species of raccoon display the same love of glittering things which is so remarkable in magpies, jackdaws, and others of the crow family. Mr. Wood mentions in his *Natural History* that a common raccoon did its best to get a ring off his finger by hitching one of its crooked claws into the ring, and pulling with all its strength; and a gentleman once resident in Guiana informed the writer of this article that a crab-eating raccoon, which he caught young, and completely tamed, showed such a propensity to steal silver spoons that he was obliged to send it away into the woods.

RACE, a term employed in some cases, particularly in the English channel, to designate the powerful current formed by a rushing tide. Thus, between the island of Alderney and cape La Hogue, on the coast of France, is the *Race of Alderney;* and off the isle of Portland, on the coast of Dorsetshire, England, is the *Race of Portland.*

RACE. "A *race* is a class of individuals concerning which there are doubts as to whether they constitute a separate species, or a variety of a recognized one. Hence the term is *subjective;* i.e., it applies to the *opinion of the investigator* rather than to the *object of the investigation;* so that its power is that of the symbol for an unknown quantity in algebra. The present writer having as yet found no tribe or family for which a sufficient reason for raising it to a new species has been adduced, has either not used the word *race* at all, or used it inadvertently. Its proper place is in *investigation,* not in exposition."—Latham, *Natural History of the Varieties of Man.*

RACE, the portion of a loom from which the shuttle is projected through the shed, or separated threads of the warp.

RACE-HORSE, a breed of horses distinguished for extreme fleetness. It owes its origin in great measure to Arabian, Barbary, and Turkish horses introduced into England. The great interest taken in horse-racing (q.v.) since the time of James I., has led to the greatest care of the animals employed in it, and the utmost improvement of the breed. The race-horse is generally longer-bodied than the hunter, and the same power of leaping is not required. See HORSE-RACING.

RACEME' (Lat. *racemus*, a bunch of grapes), in botany, a form of inflorescence (q.v.) which is *centripetal* (see CENTRIFUGAL AND CENTRIPETAL), and in which the flower-stalk throws off branchlets (*pedicels*) of nearly equal length, and each bearing a single flower. Familiar and very perfect examples of the raceme may be seen in the red or white currant and in the barberry. Notwithstanding the origin of the name, a bunch of grapes is not a true raceme, but a panicle (q.v.).

RACE'MIC ACID. See TARTARIC ACID.

RACHEL, ELISA (properly ELISA RACHEL FELIX), a celebrated French *tragedienne*, was b. at Munf, in Switzerland, of poor Jewish parents, on Feb. 28, 1820. The family removed to Lyons, in France; and in order to aid in its support, the child Rachel and her sister Sarah were in the habit of singing for chance gratuities in the streets and cafés of the place. In 1881 the household was transferred to Paris, and for Rachel, lessons were procured in singing from an eminent teacher of the day. In music, she gave no promise of special excellence; and in 1888 she made her first appearance on the stage as an actress. Though her talent had previously been discerned by certain of the more judicious (among others, Jules Janin and the celebrated Mlle. Mars), it was only in 1838 that in the character of "Camille," in Corneille's tragedy of *Les Horaces*, she first strongly attracted the attention of the public. The admiration excited by her performance rapidly grew into enthusiasm; and from this time forward, in the great parts supplied by the classic masterpieces of Corneille, Racine, and Voltaire, she shone without a rival. In 1843 her fame may be said to have culminated in her appearance as "Phèdre" in the tragedy of that name by Racine. In *Adrienne Lecouvreur*, a piece expressly written for her by MM. Legouvé and Scribe, she had also immense success, though in other more modern parts, her popularity was somewhat less. The *furor* excited in Paris in 1848 by her public recitation of the *Marseillaise Hymn*, in the interest of the revolutionary government, will continue to connect her name with the public history of the period. In 1849 she made the tour of the French provinces, and subsequently visited England and Russia, everywhere meeting with success and enthusiastic recognition. Her health, however, had begun to fail: in 1855, in the course of a professional visit to America, it altogether gave way, and she returned utterly prostrated. A residence at Cairo failed to restore her to strength; and on Jan. 8, 1858, she died at Cannet, near Toulon. As an artist, within the limits prescribed by her genius, she had probably never been quite equaled. Of the burning intensity which characterized her rendering of passion in its fiercer concentrations, no words can give an adequate image. "She does not act—she suffers," some one very well said of her. Her "Phèdre"—by common consent her masterpiece—was an apocalypse of human agony, not to be forgotten by any one who ever witnessed it. In character, Rachel was neither exemplary nor amiable. Of the details of her private life, it is as well that nothing should be said. In her professional relations, she was notoriously grasping and avaricious. Her immense popularity enabled her, during much of her career, pretty much to dictate her own terms to managers, and of this power, she is said to have availed herself without scruple or generosity. In this way she very rapidly amassed a large fortune. If little else of good is on record of her, she was constant in her home affections, and throughout she frankly made her whole family sharers of her prosperity.

RA'CHIS (Gr. the back-bone), in botany, the *primary floral axis*, an elongation of the stem or of a branch, from which arise the flower-stalks (peduncles), or to which the flowers are immediately affixed.

RACINE, a co. in s.e. Wisconsin, drained by Fox and Root rivers, and bounded by lake Michigan on the e.; traversed by the Chicago and Northwestern and the Western

Union railroads; 340 sq.m.; pop. '80, 30,921—20,313 of American birth. Surface level and fertile; wheat, oats, corn, hay, and cattle are the staples. Co. seat, Racine.

RACINE, a city of Wisconsin, situated on lake Michigan, at the mouth of Root river, which forms an excellent harbor, and on the line of the Chicago and Milwaukee railway, 23 m. s. of Milwaukee. It has ship-yards, factories, furnaces, etc. Pop. '60, 7,822; '70, 9,880; '75, 13,282.

RACINE (*ante*), pleasantly situated on land elevated about 40 ft. from the level of the lake, and projecting several m. beyond the shore line; pop. '80, 16,031. It is a station on the Milwaukee division of the Chicago and Northwestern, and on the Western Union railroads. The town, incorporated in 1848, is inferior in size to Milwaukee only. The city is pleasantly laid out and has many fine residences. On the chief street (Main st.) is Racine college, an Episcopal institution, established in 1852, in which are about 20 instructors and 200 students. The lake commerce of the city is considerable, but manufactures are the chief source of wealth. The number of factories is large; among the articles produced are boots and shoes, wagons, threshing-machines, and other agricultural implements, silverware, and trunks. There are 4 papers, 2 banks, a Roman Catholic academy, and public schools, an orphan asylum, hospital, and 24 churches.

RACINE, Jean, the most admired of all the French dramatists, was b. at Ferté-Milon, Dec. 21, 1639, of a respectable family belonging to the *bourgeoisie*. At the age of four he lost both his parents, and then went to live with his maternal grandfather, by whom he was sent to the college of Beauvais. Here he remained till he was 16, at which time his grandfather died. He was then taken to Port Royal (q.v.), where his grandmother and his aunt Agnes were leading a recluse life, and placed at the school which had been opened in that celebrated retreat by the pious scholars assembled there. Racine astonished his teachers by the rapidity of his progress in all his studies, especially in Greek; but he won their regards still more by the affectionate seriousness of his character, which gave a delicacy to his ardent sensibilities and vivid imagination. They loved him, yet they trembled for him. When they saw him wander—Sophocles or Euripides in his hand—among the shadows of the abbey, anxiety took possession of their hearts; and when they learned that he secretly indulged in the sinful pastime of making verses, they even thought it necessary to punish their favorite. Their punishment was indeed an odd one, for they obliged him to turn the hymns of the Roman breviary into French verse! Novels were placed under the same ban as poetry. One day the sacristan Lancelot found him reading the Byzantine romance of bishop Heliodorus (q.v.), entitled *The Loves of Theagenes and Charicleia*, and threw the book in the fire; but Racine says that it was already fixed in his memory, and that he smiled at this futile attempt to rob him of it. We can easily see that Racine was not at all ascetically disposed as yet. After a residence of three years at Port Royal, during which time he had, among other things, read and annotated the best Greek and Latin classics, he went to the college d'Harcourt to finish his curriculum with the study of logic. Then he went out to "see life," got into loose company, became irregular himself, and even grew so reckless as to burlesque, in his correspondence, the pious phraseology in vogue at Port Royal. Deep was the grief and incessant were the remonstrances of his old friends, but they were long without avail. He had made some little name as a poet by an ode on the marriage of the king, and had had the good fortune to get a pension for it, but still his income was small and precarious; and when a maternal uncle, who was a canon-regular of the church of St. Genevieve at Uzès, in Languedoc, held out to him the hope of a benefice, Racine went to live with him in 1661, and tried to study systematic theology. But the effort was a hopeless one. While he gazed vacantly into the *Summa* of St. Thomas, his thoughts were with Ariosto and Sophocles. In the summer of 1662 he returned to Paris in disgust, and commenced life as a dramatic writer, having meanwhile made the acquaintance of Molière and Boileau. His first piece was the *Frères Ennemis*, played in 1664; but it was not till 1667, when his *Andromaque* appeared, that the power and peculiar character of his genius excited marked attention. For the next ten years his career as a dramatist was unsurpassably brilliant, yet, strange to say, we know almost nothing of his private or social life during that time. We have to content ourselves with little more than a few meager facts relative to his literary performances, the chief of which are *Britannicus*, *Berenice*, *Bajazet*, *Mithridate*, *Iphigenie*, and *Phèdre*. Suddenly, at the early age of 38, in the full sunshine of his fame and vigor of his power, he resolved to abandon both the stage and the world, and become a Carthusian monk. The effect of his Port-Royal training was now seen. In the midst of all his literary ambitions and strifes, his little excesses, irregularities, and amours, Racine had carried with him a keen and faithful conscience; and partly from disappointment, partly from remorse, he longed to forget all in acts of devotion. With difficulty he was prevailed upon to modify the rigor of his purpose, and instead of seeking for religious felicity through the privations of solitude, and the severities of penance, to do so through marriage with some pious woman, and the cultivation of domestic virtues. A suitable lady—very devout, but not very intelligent—was found for the poet in the daughter of the city-treasurer of Amiens, and the marriage took place in 1677. Seven children, two sons and five daughters, were the fruit of this union. Shortly after it, Racine was appointed historiographer to the king. Henceforth his course of life was pursued with the utmost regularity—one-third of the day being given to God, another to his family and friends, and the remainder to the king. His *Esther* (1690) and *Athalie* (1691) are the only dramas which he produced after his conversion, and they are profoundly imbued with religious feeling. *Athalie* is reckoned by some his finest effort, and certainly the only one which can at all be placed in comparison with it is the *Phèdre.* The poet died, after a brief illness, on April 21, 1699.

Racine's dramatic genius was essentially French, or pseudo-classical, and therefore it is not easy for Englishmen trained to appreciate the power, magnificence, and variety of the Shakespearian tragedy, to sympathize with it or to criticise it impartially. In the eyes of his countrymen, he is the most perfect, if not the most sublime, of all their dramatists. Corneille may at times exhibit a grander and more rugged energy, but in beauty, grace, and a certain tender majesty of style, Racine is held to be without a rival; and it must be remembered that *style*, and not portraiture of human character, is the thing in which French dramatists aim to shine. The declamations in which the heroes and heroines of Racine indulge are marvelously fine pieces of rhetoric; but, compared with the Elizabethan drama, they are deficient in deep insight into human nature and in genuine passion, while humor is altogether excluded. See *Mémoires* of Racine, edited by his son Louis. The editions of his works are innumerable, and some are of great splendor; that of Girodet (Paris, 3 vols. 1801–05) being reckoned one of the finest specimens of typography in the world.

RACK (Sax. *wrocan*, Ger. *recken*, to stretch), an instrument of torture, used for extracting confessions from criminals and suspected persons. It consisted of a large oblong frame of wood, with four beams a little raised from the ground, on which the sufferer was stretched and bound. Cords were attached to his extremities, and gradually strained by means of a lever and pulleys, till the operation, if persisted in, caused dislocation of the limbs. The rack was known in the 1st and 2d centuries in the s. of Europe, and applied to the early Christians. It was in use in England in the 15th and 16th centuries. According to Coke, it was first introduced into the tower by the duke of Exeter, constable of the tower, in 1447, whence it came to be called the "duke of Exeter's daughter." It is mentioned by Holinshed in 1467; but its use first became common in the time of Henry VIII. as an implement of torture for prisoners confined in the Tower. The infliction of the punishment of the rack took place during the reign of the Tudor sovereigns by warrant of council, or under the sign-manual. In 1628, however, on the murder by Felton of the duke of Buckingham, it being proposed in the privy-council to put the assassin to the rack, in order that he might discover his accomplices, the judges resisted the proceeding, as contrary to the law of England. In various countries of Europe the rack has been much used both by the civil authorities in cases of traitors and conspirators, and by members of the inquisition to extort a recantation of heresy. It is no longer in use in any part of Europe.

RACK, or RACK-WORK, is a straight bar, with cogs or teeth placed along it, so as to correspond with similar cogs or teeth placed on a wheel, thus: If the bar is not movable, the wheel is attached to a traversing frame, and as it revolves, is moved along by the resistance of its teeth to those on the bar. It was in this way that the formation of a railway was first projected, the rail and the driving-wheel of the engine to be both furnished with corresponding teeth. In mechanics, rack-work has innumerable applications.

RACK'ETS (Fr. *raquette*), a game frequently played in England; it is merely a modern variety of the old game of tennis (q.v.).

RACK-RENT is the full yearly value of lands let upon lease, or to an occupier, or held by a tenant for life, as distinguished from the value fixed by the lease or agreement between the parties, and which is often less or greater than the real value.

RACOON'DA, or NUTRIA, the fur of the coypu (q.v.).

RACZ, or O BECZE, a t. of Hungary, in the Servian Wojwodschaft, on the right bank of the Theiss, 26 m. n.e. of Peterwardein. It carries on an extensive trade in corn. Pop. 11,000.

RADACK AND RALICK, two parallel chains of islands in the group called Marshall's islands. See POLYNESIA.

RADCLIFFE, ANN, the most popular English novelist at the close of the last century, was b. in London, July 9, 1764. She was of respectable parents named Ward. In her 23d year she married Mr. William Radcliffe, a student of law, but who became proprietor and editor of a weekly newspaper, the *English Chronicle.* Mrs. Radcliffe lived much in retirement, known only to a few friends, by whom she was warmly esteemed. Her works are—*The Castles of Athlin and Dunbayne* (1789); *A Sicilian Romance* (1790); *The Romance of the Forest* (1791); *The Mysteries of Udolpho* (1794); *A Journey through Holland,* etc. (1794); and *The Italian* (1797). Mrs. Radcliffe's popularity was constantly increasing down to the date of her latest work, when, in her 33d year, "like an actress in full possession of her applauded powers," as Scott has remarked, "she chose to retreat from the stage in the full blaze of her fame." She lived 26 years afterward, dying in 1823. For the copyright of her *Mysteries of Udolpho,* her best work, she received £500; and for that of *The Italian*, £800. These sums were at the time considered excessive, and were perhaps the largest ever given in this country for works of fiction until the great era of the Waverley novels. A sixth romance, entitled *Gaston de Blondeville*, and a collection of *Poems* by Mrs. Radcliffe, were published after her death.

As a novelist, Mrs. Radcliffe is pre-eminent for vivid poetical imagination, and for great power of romantic narrative and description. Her paintings of external nature, and of scenes of feudal pomp, gloom, terror, or mystery, are quite unrivaled in modern romance. In the art of awakening curiosity and enchaining attention, she is no less skillful. She keeps her readers in a state of breathless awe and suspense; but in the end, when she resolves all the seemingly supernatural agencies and horrors of her tales into simple natural causes, she unquestionably fails, for her explanations are inadequate to account for the effects produced. She has also little variety of character or striking individual portraits, and no wit or humor. Hence her works, with all their gorgeous pictures and potent spells, seldom interest beyond the period of youth.

RADCLIFFE, Dr. John, a celebrated physician, and the founder of the Radcliffe library at Oxford, was born at Wakefield in Yorkshire, in the year 1650. He was instructed in Greek and Latin at the grammar-school of his native town; and at the early age of 15 he was sent to University college, Oxford. In 1672 he took his degree of M.A., applied himself to the study of medicine, and having taken his degree of M.B. in 1675, began to practice as a licentiate at Oxford. He immediately made himself conspicuous by the originality of some of his ideas, treating the cases in which he was engaged with a total disregard of the usually received rules of the profession, and even holding up these to censure and ridicule. At the very commencement of his practice he made some remarkable cures; and in less than two years was on the high road to celebrity. In 1682 he took the degree of M.D., and remained still two years longer at Oxford in the practice of a lucrative profession.

In 1684 Dr. Radcliffe removed to London. He established himself in Bow street, Covent garden, where, in less than a year, he became the most popular physician of his time. It is said that his conversational powers, ready wit, and pleasantry contributed to this result, quite as much as his professional skill. In 1686 the princess Anne of Denmark, made him her physician. After the revolution, he was sent for by king William, who frequently had recourse to his advice, and the example of the sovereign was followed by most of the nobility and influential persons about the court. Dr. Radcliffe, however, was himself no courtier; he had no occasion to become one. Dr. Mead, who knew him well, pronounced of him, that he was "deservedly at the head of his profession, on account of his great medical penetration and experience." Blunt and independent in his manners—some indeed say even *brutal*, people nevertheless recognized under his rough exterior that quick perception and keen observation of symptoms which are so important in a master of the healing art; and thus his advice was asked by persons of all ranks, in return for which he received fees of an unprecedented amount.

In 1694 he was called upon to attend queen Mary, when attacked by the small-pox. It proved to be her last illness, as Dr. Radcliffe predicted, even before seeing her—merely upon reading the prescriptions of the other physicians in attendance before he was sent for. He did what he could, however, to save her, but in vain; and some attributed her death either to his want of skill or negligence. About this time he offended the princess Anne, who, having sent for him on some occasion to St. James's, had the mortification to hear that he swore all her royal highness's ailments were nothing else than "the vapors." This, combined with her knowledge of Dr. Radcliffe's too great fondness for the bottle, made her appoint Dr. Gibbons as her physician in his place. Still, the king continued to employ him. On one occasion, he sent for him to the Netherlands to attend upon his favorite, the earl of Albemarle, for which he received £1200 from the king, and £400 from the patient himself, besides a diamond ring. To the king himself he frequently spoke with much honesty and plainness concerning his ailments; once, however, he took too great a liberty, for upon his majesty showing him his swollen ankles, and asking him what he thought of them, Dr. Radcliffe replied, "Why, truly, I would not have your majesty's two legs for your three kingdoms." This was toward the end of 1699. He was not again consulted by that sovereign, who soon afterward died; nor was he ever again completely reinstated in the good graces of queen Anne, although she occasionally consulted him, and rewarded him handsomely for his services.

In 1713 he was elected M.P. for Buckingham. He had a country-house at Carshalton, to which he used occasionally to retire; and here he was living in 1714, when queen Anne was attacked with what proved to be her last illness. Dr. Radcliffe was summoned to attend her, but he either would not or could not come. He had taken physic, he said, and it was impossible for him to attend. The queen died in August; and the populace were so enraged against Dr. Radcliffe that he dared not again show his face in London. This much chagrined him, as it kept him a prisoner in a country village. His own end, however, was fast approaching. He must have been really ill when sent for to the queen, as he himself survived her for only two or three months. Dr. Radcliffe died of gout at Carshalton on Nov. 1, 1714, and was buried at Oxford in St. Mary's church with much ceremony. He died possessed of considerable property, the whole of which he bequeathed to public uses. Thus, to University college he left his estate in Yorkshire, in trust, for the endowment of two traveling fellowships, and the purchase of perpetual advowsons, together with £5,000 for the enlargement of the college buildings. He left £40,000 for the erection of a public library in Oxford, since known as the Radcliffe library (q.v.), which he endowed with £150 per annum for a librarian, and £100 per annum for the purchase of books. To St. Bartholomew's hospital, London, he bequeathed the yearly sum of £500 toward mending the diet, and £100 per annum for the purchase of linen. The rest of his property he gave to his executors in trust for such charitable purposes as they might best approve. The Radcliffe infirmary and Radcliffe observatory, at Oxford, were both erected out of this fund; and from the same source, in 1823, the Radcliffe trustees contributed the sum of £2,000 toward the erection of the college of physicians in Pall Mall.

RADCLIFFE LIBRARY, Oxford. This institution, founded by Dr. John Radcliffe (q.v.), stands in the central area of Radcliffe square. The building is in the form of a rotunda, standing upon arcades, from the center of which rises a spacious and well-proportioned dome. This dome is 84 ft. in height from the pavement, and is beautifully wrought in stucco. The architect was James Gibbs, who commenced the building in 1737, and completed it in 1747. The library is approached by a handsome stone staircase, and over the entrance-door hangs the portrait of the founder by sir G. Kneller. The books composing the library are for the most part works on natural history, physical science, and medicine. Besides these, Gibbs, the architect, bequeathed to it a collection of works, chiefly architectural; Wise, the first librarian, a collection of coins; Kennicott, a theological collection; Frewen, a miscellaneous library; Viner, some law-books; while from the Frazer and Sale collections the trustees purchased 355 oriental MSS. in the years 1758 and 1760. In 1856 the number of volumes comprising the scientific and medical collection was estimated by Dr. Acland, the librarian, as not less than 14,000, and not more than 15,000. From the year 1834 to the year 1840, the trustees expended £500 annually on the purchase of books. The grant, however, was reduced to £200 in 1841, and continued at that low figure until 1863, when it was again raised to the sum of £500. In 1861, by an agreement between the Radcliffe trustees and the university, the scientific books of the Radcliffe library were removed to the university museum, then recently erected, for public use under prescribed regulations, and the spacious room in the Radcliffe library was opened as a reading-room in connection with the Bodleian library. This reading-room is now open daily until 10 o'clock at night, to the great comfort and convenience of numerous readers.

RADEGUNDA, SAINT, daughter of Berthar, a prince of Thuringia, in the earlier part of the 6th century. Having been carried as a prisoner to France in the twelfth year of her age by Clotaire, at that time king of the district whose capital is now called Soissons, she was educated in the Christian religion, and when she reached a mature age, was induced, very reluctantly, to become the wife of Clotaire. Her own wish having been to become a nun, her married life was in great measure given up to works of charity and religion, and Clotaire complained that he "had married a nun rather than a queen." Eventually, about the year 553, she obtained his leave to retire to a monastery at Noyon, where she was consecrated a deaconess by the bishop Medard. Soon afterward she founded a monastery at Poictiers, in which she lived as a simple sister, but which she endowed richly, not only with money and lands, but also with relics and other sacred objects obtained from the Holy Land and all the more eminent churches of the e. and west. It was on the occasion of the translation to her church at Poictiers of a relic of the holy cross that the Christian poet Venantius Fortunatus composed the celebrated and truly magnificent hymn *Vexilla Regis Prodeunt.* Radegunda outlived her husband by more than a quarter of a century, during which she was regarded as a model of Christian virtue; and her life has formed the subject of many beautiful legends, still popular in Germany and France. Her monastery, before her death, which took place in 587, numbered no fewer than 200 nuns. Her feast is held on Aug. 13, the anniversary of her death.

RADETSKY, JOHANN JOSEPH WENZEL, Count of Radetz, and an Austrian field-marshal, was born at Tzrebnitz, in Bohemia, in Nov., 1766; and in 1784 entered the Austrian military service as a cadet in a Hungarian cavalry regiment, making his first campaign against the Turks in 1788–89. He took part in the Austrian wars with Napoleon, brilliantly distinguished himself, and rose to the rank of lieut. field-marshal. After the conclusion of peace, he was stationed mostly in Hungary; but the threatening aspect of affairs in Italy caused him to be sent to take the command of the Austrian army in Lombardy; hostilities were, however, deferred, and Radetsky seized this opportunity of putting Verona in a complete state of defense. The emperor Ferdinand, on his accession in 1836, acknowledged Radetsky's numerous and valuable services by raising him to the rank of field-marshal. The rebellion at last broke out suddenly in 1848, and Radetsky was forced to retire from Milan and continue his retreat to Verona (April 2). His departure was the signal for a general insurrection, only the renowned Quadrilateral (q.v.) and the citadel of Ferrara remaining in the hands of the Austrians; and the revolt of Venice cut off all Radetsky's communications except that to the Tyrol. The Piedmontese army had now effected the passage of the Mincio (May 7), and closely invested

Peschiera, thus rendering Radetsky's position an extremely critical one. He had only 50,000 men to oppose to the Piedmontese army of 41,000 men around Peschiera, a corps of observation 6,000 strong near Mantua, a body of 4,000 guarding the passage of the Mincio, the Roman army of 14,000 men holding the s. bank of the Po, and an army of Venetian insurgents, numbering 15,000, in his rear. Being thus unable to take the offensive, he waited anxiously for the re-enforcements which he expected by the Illyrian frontier, and which, after defeating the Venetian and Roman armies which attempted to stop their progress, joined him at Verona, on May 22. The Austrians now assumed the offensive, and marched on Mantua, defeating the Italians in two bloody conflicts at Montanara and Curtatone, but were in turn signally vanquished at Goito by Charles Albert, who gained by this victory the immediate surrender of Peschiera (May 29), and rendered Radetsky's position more critical than ever. But the gallant Sardinian was no match for Radetsky in generalship, for he wasted his time before Mantua till Radetsky had raised an army of 82,000 men, with which he drove the king (July 22 and 23) back, defeated him at Custozza (July 25), pursued him closely, converted his retreat into a disorderly flight, and again defeated him under the walls of Milan (Aug. 4). The king was now besieged in Milan, but (Aug. 6) a six months' armistice was agreed to, and war was not resumed by the Piedmontese till Mar., 1849. Radetsky was this time better prepared, and at once invaded Piedmont; after a successful brush with the enemy at Vigevano (Mar. 21), he totally routed them at Novara (Mar. 23), after an obstinate conflict of six hours' duration. Peace was now concluded with Piedmont, and Radetsky next besieged Venice, which surrendered after a long siege (Aug. 23). He was then appointed governor-general of Lombardy and Venice, and ruled with absolute authority till his retirement on Feb. 28, 1857, suppressing all insurrections and disturbances with the utmost rigor. He died at Milan, Jan. 5, 1858, at the age of 91 years. He bore the character of a brave soldier and consummate tactician, and, strange to say, acquired all his European reputation after he had passed his 80th year.

RADFORD, WILLIAM, b. Va., 1808: entered the navy in 1825, rose through successive grades to the rank of rear-admiral, 1866. He distinguished himself at Mazatlan in 1847, and commanded the *Cumberland* in 1861; was on court-martial duty at Old Point Comfort when the *Cumberland* was sunk in her encounter with the *Merrimac*. He was in both battles at fort Fisher 1864–65, in command of the *New Ironsides* under admiral Porter, and in 1869–70 commanded the European squadron.

RADIA'TA, the lowest of Cuvier's four great divisions of the animal kingdom, derive their name from the organs of sense and motion being disposed as rays round a center; the other three, in ascending order, being the *articulata*, the *mollusca*, and the *vertebrata*. Before Cuvier's time all invertebrate animals were divided into *worms* and *insects*. In 1795 he presented a memoir to the natural history society of Paris, in which, to use his own words, he "marked the characters and limits of the mollusks, crustaceans, insects, worms, echinoderms, and zoophytes;" and in a memoir read before the institute in July, 1812, he "distributed these various classes under three grand divisions, each of which is comparable to that of the vertebrate animals." The necessity for the dismemberment and rearrangement of this heterogeneous assemblage which Cuvier grouped together in his RADIATA has long been felt; and at the present day "the radiate mob" (as prof. Huxley terms it) may be regarded as effectually demolished. To show how these animals have been rearranged, it is necessary first to mention that Cuvier himself divided them into five classes—namely (1) the *echinodermata*, (2) the *entozoa* (or intestinal worms), (3) the *acalephæ* (or sea-nettles), (4) the *polypi*, and (5) the *infusoria*. The *echinodermata* are now included by Huxley (*Elements of Comparative Anatomy*, 1864) in the *annuloida* (one of the eight primary groups into which he divides the whole animal kingdom); while J. Victor Carus (*Handbuch der Zoologie*, 1863), makes them an independent group. The entozoa are placed by Huxley under the *annuloida*, and by Carus under the *vermes*. The acalephæ are by unanimous consent placed in the *cœlenterata*, a primary group established by Frey and Leuckart. Of the polypi, those with ciliated arms (the bryozoa or polyzoa, of which the sea-mat or flustra is a well-known example) are now placed among the lower mollusks, which, under the term *molluscoida*, are considered by Huxley as one of the eight primary groups; while the remainder are placed amongst the *cœlenterata*. The infusoria are now regarded by most zoologists as a class of the *protozoa* (q.v.), a primary group established by Siebold. See SUBKINGDOMS, ANIMAL.

RADIATION, a term applied to the transmission of certain qualities of vibratory motion which take place in the luminiferous ether, producing heat, light, and actinism, or chemical action. All these forms of radiation are produced, according to received theory, by similar undulations in the ether, the only difference being in their length; the longer undulations producing, when impinging upon matter, the greatest amount of heat; the medium-length undulations the greatest amount of light, while the shorter vibrations or wave lengths, included in the more refrangible rays, have the greatest power to sever chemical combinations. See *Radiation* in art. HEAT, *ante;* also SPECTRUM and DIATHERMANCY. The subject of radiation has received much attention from scientists within a few years, and many interesting discoveries have been made, which go to indicate that the rays of light as well as of heat possess mechanical force which may be converted into continuous motion, the experiments of Mr. Crookes, of London, being among the most remarkable in this field. See RADIOMETER. The results of these experiments have raised a doubt in the minds of some in regard to the undulatory theory of light. Some of the phenomena suggest the action of the direct motion of particles of matter; but such a hypothesis was found long ago insufficient to account for many of the phenomena of radiation, and it is more probable that the theory of undulations will, as it has in all cases so far, afford sufficient explanation for the phenomena now under investigation. See the article SPECTROPHONE and PHOTOPHONE.

RADIA'TION OF HEAT. See HEAT.

RADICAL (Lat. *radicalis*, fundamental, from *radix*, root), originally *radical reformer*, a name applied to one of the political party which advocates extreme changes of a democratic character in the state.

RADICALS, in chemistry. A radical is a term introduced by one of the fathers in chemistry, Guyton de Morveau, in 1787, but its signification was then more restricted than now, because chemistry was then a more restricted science. Its general meaning, however, allowed it to be gradually extended as the science advanced. It was used to signify a substance which, uniting with oxygen, would form an acid; in other words, it might be called an acidifiable base, either simple or compound. As the science of chemistry advanced and the number of compounds which were studied and produced multiplied, the word radical became to be applied to any simple or compound body possessing the power of uniting with an electro-negative body, or element, to form an acid, neutral, or basic body. But the term is principally applied to compound bodies which are held together in such a way that they do not always break up when the compound of which they form a part is decomposed, or, if they do break up, hold an elemental relation to it. The idea of a compound radical may be expressed thus: Suppose one or more of the component atoms of a fully saturated compound molecule to be removed; it is clear that the remaining molecule or group of atoms will no longer be saturated, but will have a combining power corresponding with the number of units of equivalency removed. Such a remaining molecule or group of atoms is a radical. Methane is a fully saturated compound, CH_4, but, if one of its hydrogen atoms is removed, there will be left the radical methyl, CH_3, one molecule of which has the power to unite with one molecule of a univalent element, or two molecules with one molecule of a bivalent element, etc. Ammonia, NH_3, in which the nitrogen is trivalent, yields, on the removal of a molecule of hydrogen the univalent radical amidogen, NH_2, which, with one molecule of potassium, forms potassamine, NH_2K, and when combined with one molecule of the univalent radical methyl, CH_3, forms methylamine, NH_2CH_3. The loss of two molecules of hydrogen from ammonia leaves the bivalent radical imidogen, NH, which, with two molecules of methyl, forms dimethylamine, $NH2CH_3$, while the removal of all three of the hydrogen molecules from ammonia leaves nitrogen alone, which often acts the part of a trivalent radical, as for example, when uniting with three molecules of potassium to form tri-potassamine, NK_3, or with three molecules of methyl to form tri-methylamine, $N3CH_3$. Again, a molecule of water, H_2O, when losing a molecule of hydrogen, becomes the radical *hydroxyle*, HO, a body analogous in its affinities to chlorine, bromine, and iodine. Water, HO.H (H_2O), may therefore be compared to hydrochloric acid, ClH, in which the hydroxyle replaces chlorine, or the contrary, while potassium hydroxide, KHO, may be compared to potassium chloride, KCl. See CHEMISTRY.

RADIOLI'TÉS, a genus of lamellibranchiate mollusca, found only in cretaceous rocks, and remarkable for the great diversity of its valves. The upper valve is flat or conical, with a central umbo; and the lower is an elongated cone, and has on its inner surface two large dental sockets, and lateral muscular impressions. The upper valve is not perforated with canals, as in the nearly related genus hippurites. More than forty species have been described.

RADIOM'ETER, an instrument invented by prof. William Crookes of London to measure the comparative intensity of radiation in different colored or heated rays. It consists of a number of delicate arms (usually four), supported at their center of horizontal motion, and above the center of gravity, upon a needle-point, so that they may revolve with the least resistance. Each arm carries at its extremity a very light disk of pith or of mica, blackened upon one side, the blackened surfaces all facing in the same relative direction. The invention was the result of researches on the atomic weight of the metal thallium, in which it was sought to eliminate the error caused by the decrease of weight of a body heated in air. He placed a balance in an exhausted vessel, but this not succeeding he made the following experiment. In an exhausted vessel he suspended a pith bar, while another pith bar was suspended in a vessel containing a natural quantity of air, and found that the bar in the exhausted vessel was repelled by a hot body, while that in the unexhausted vessel was attracted by it. An apparatus, the initial step in the construction of the radiometer, was devised to attain quantitative results. A ⊥ shaped tube of glass had suspended in it, by a delicate glass fiber, a small horizontal rod carrying upon each end a blackened disk of pith. The suspending fiber was attached above near the upper end of the vertical arm, and also to the middle of the horizontal bar, balancing it. Thus, then, was formed a sort of Coulomb's torsion balance, though not for electrical measurement. To observe and to measure the motions of the horizontal rod, it had placed at its middle a mirror for reflecting a beam of light on a distant graduated horizontal scale, like that employed in sir William Thomson's marine galvanometer. The slightest revolving motion of the horizontal bar would then cause the reflected ray of light to traverse a considerable portion of the graduated scale. A pure spectrum, obtained by a system of lenses, etc., acting on a beam of light reflected by a heliostat, was employed in its different parts successively to act upon the blackened disks of the balance. The repulsion produced by the different portions of the spectrum, for equal areas, was for each as follows, comparatively: ultra red, 100; extreme red, 85; red, 73; orange, 66; yellow, 57; green, 41; blue, 22; indigo, 8.5; violet, 6; ultra violet, 5. The repelling power diminished inversely as the square of the distance between the disk and the source of radiation, a result naturally to be expected. He found also that a blackened disk was repelled more than five times as much as a plain one. Upon this hint he constructed his radiometer. The cause of the motions has been differently explained, some attributing it to the increased freedom of kinetic vibrations of the residual molecules in the exhausted vessel, and which are more active near the blackened surface; but the question is not settled. Mr. Crookes's investigations will probably lead to other important discoveries in regard to radiation and radiant matter.

RADISH, *Raphănus*, a genus of plants of the natural order *cruciferæ*, having a spongy silique (q.v.), which does not split open when ripe, ends in a conical or awl-shaped beak, and is more or less divided into transverse cells, in some species adhering together even in decay, and in some falling asunder. The flowers are yellow, red, or purple. The common radish (*R. sativus*) has thick, round, tapering, and pointed pods, little longer than their stalks, very slightly contracted, and not falling to pieces. It is an annual, with branching stem from two to four ft. high, rough lyre-shaped leaves, and pale violet-colored flowers with dark veins. It is a native of Asia, from the coasts of the Mediterranean to Japan, and has been cultivated in China, India, and Europe from the most ancient times, for the sake of its fleshy roots, which have a sharp biting taste, and are much used when young as a salad, and also to some extent as a boiled vegetable. In this latter way, the young and tender leaves were also formerly used. The varieties of radish in cultivation are extremely numerous; but they are generally classed under the two heads of *long-rooted* and *turnip-rooted* radishes, the roots of the former resembling the carrot in shape, and the latter the turnip. The varieties differ very much, not only in form of root, but in color and size, a red color generally prevailing. Some of the dark-colored turnip-rooted radishes attain the size of a man's head. Radishes are sown at different seasons, and are generally used when young and small; but some kinds are occasionally stored for winter. The root of the radish possesses demulcent, stimulant, and diuretic properties, and is sometimes used in cases of atony, or of excessive secretion of mucus by the organs of digestion or the urinary organs. Radish juice, mixed with sugar candy, is a popular and useful German remedy for hoarseness and cough.—Distinct from both the varieties above-named is the oil radish, which has a slender, scarcely fleshy, root, a short much-branched stem, and many-seeded pods. It is cultivated in China for the oil of its seeds.—Another species of radish (*R. caudatus*), a native of Japan, is there cultivated as an esculent. To this genus belongs the jointed charlock of our corn-fields (*R. raphanistrum*), which has found its way from Europe to North America, and is a troublesome weed there also. The seeds, however, may be advantageously crushed for oil.—The sea-radish (*R. maritimus*) is a more rare British species, the roots of which are of fine quality and great pungency.

RA'DIUS, in geometry, is a straight line drawn from the center to the circumference of a circle. See CIRCLE and QUADRATURE. In trigonometry, the radius is taken as unity, and the sines, cosines, etc., are expressed in terms of it. In astronomy the same term is employed in a slightly different sense; and to prevent confusion it is changed into *radius-vector*. The radius-vector is a straight line drawn from the center of force to the position of a body which describes its orbit round that center; if the orbit is a circle, the radius-vector is invariable in its length, but constantly changes if the orbit be any of the other conic sections. From astronomy the term has been transferred to what are called *polar equations* in the higher mathematics. To express a curve by this method a point is taken for the *pole;* through this point a line, the *axis*, is drawn, indefinite in length and arbitrary in direction; then as one end of the radius-vector is at the pole, its inclination to the axis, and its length at this inclination, will give a point in the curve. Equations to curves, when thus expressed in terms of the radius-vector, and its inclination to the axis, are called *polar co-ordinates*, and are generally much simpler in form than when expressed by rectangular *co-ordinates* (q.v.).

RAD'NOR, NEW, a municipal and parliamentary borough in Radnorshire, of which it was formerly the capital, stands in the midst of exceedingly wild and hilly scenery, on the south border of Radnor forest, and 8 m. w.s.w. of Presteigne. In the immediate vicinity is the cascade of *Water-break-its-neck*, which descends from a height of 70 ft., and is one of the most celebrated in Wales. New Radnor, once comparatively important, has dwindled into a small country town, remarkable only for the beauty of the surrounding scenery. In 1864 a statue in memory of sir George Cornewall Lewis was erected at New Radnor. Pop. (of parliamentary borough) in '71, 2,190. The business of the county is transacted at Presteigne, the county town, which contains, '71, 1910 inhabitants.

RADNORSHIRE, an inland co. of south Wales, bounded on the n. by Montgomeryshire and Shropshire, and on the s. and s.e. by Brecknockshire and Herefordshire. Area, 276,552 acres; pop. '71, 25,430. Groups of mountains, seldom forming themselves into continuous chains, cover the greater part of the surface of the county. Radnor forest, which attains the height of 2,163 ft., runs e. and w., and is the loftiest and most connected of the ranges. The south-eastern district is flat, with a gradual slope toward the east. Of the rivers, the chief of which flow southward, the principal is the Wye (which forms the greater part of the southern boundary of the county), and its tributaries the Ithon, the Elan, and the Lugg. The county formerly comprised large tracts of bog and moor land, which are in course of being gradually reclaimed and cultivated. Its valleys, especially that watered by the Lugg, are famed for the richness of their pastures, which feed splendid herds of "Herefords." In the e. and s.e. districts of Radnorshire excellent wheat, barley, oats, and potatoes are grown. Though rather more than half the county is cultivated, yet of this less than a third is under the plow, fully two-thirds being in permanent pasture, chiefly for rearing sheep. The county returns one member to the house of commons.

RADOM, a government of the kingdom of Poland (q.v.), is situated to the s. of the government of Warsaw. Area, 4,755 sq.m; pop. '70, 532,466. The surface, partly traversed by the Sandomir mountains, which rise in the Katherinenberge to the height of upward of 2,000 ft., is the most elevated of the kingdom. The principal rivers are the Pilica and the Vistula, both of which flow north. The soil is diversified.

RADOM, capital of the government of the same name, stands on the Radomka, 60 m. s. of Warsaw. It has considerably improved in size within late years, and is the seat of an active trade and commerce. Pop. '67, 10,944.

RADOWITZ, JOSEPH VON, Prussian general and statesman, b. Feb. 6, 1797, at Blankenburg, was the son of a nobleman of Hungarian descent, received his professional education at Paris, and in the military school of the kingdom of Westphalia, which he left in 1813, in order to enter the Westphalian army as an officer. After the peace in 1815 he received an appointment as master of mathematical and military sciences in the military school of Cassel; but in 1823 he entered the Prussian service, and in 1830 became chief of the general staff of artillery. By his marriage with the countess Maria v. Voss (1828), he became connected with the Prussian aristocracy, and soon became the leader of the anti-revolutionary party. In 1836 Radowitz was sent as Prussian military commissioner plenipotentiary to the German diet at Frankfort. In 1842 he was named ambassador extraordinary and minister plenipotentiary at the courts of Carlsruhe, Darmstadt, and Nassau; and in 1845 he was raised to the rank of maj.gen. Meanwhile his influence on public affairs in Germany became more and more conspicuous; above all, he was the confidant and adviser of king Frederick William IV. in his endeavors to bring about a reform of the German diet, as his pamphlet, Germany and Frederick William IV. (*Deutschland und Friedrich Wilhelm IV.*, Hamb. 1848), proves. His *Conversations about State and Church*, suggested by the present state of affairs (*Gespräche aus der Gegenwart über Staat und Kirche*, Stuttg. 1846), may be taken as a manifestation of the intentions which tried to find a practical issue in the constitution of Feb. 3, 1847. When the revolution of 1848 broke out, a new field opened itself for Radowitz. The endeavors of Prussia to give a constitution to Germany, by means of the alliance of the three kings, was principally his work. He now obtained the leadership of the affairs of the union in the Prussian chambers as well as in the parliament, which assembled (March, 1850) at Erfurt, but was unable to prevent the failure of the union scheme. On Sept. 27, 1850, he became formally secretary for foreign affairs, but in 1851 retired to Erfurt, where he wrote his *Neue Gespräche aus der Gegenwart* (2 vols., Erf. and Leip. 1851). He died Dec. 25, 1853.—Consult Frensdorff, *Joseph v. R. A.* (Leip. 1850).

RAEBURN, Sir HENRY, R.A., a distinguished portrait-painter, was b. on Mar. 4, 1756, at Stockbridge, then a village near Edinburgh, where his father was a manufacturer. His parents died when he was little more than six years old, and he was educated in that well-known institution, George Heriot's hospital. He was apprenticed to a goldsmith and jeweler when about 15 years of age; but having a very decided taste for art, he practiced miniature-painting during his leisure hours with such success that he was soon enabled to buy up his indenture and devote himself first to miniature, and not long after to portrait-painting in oil. He married when he was 22, and acquired some fortune by his wife. Proceeding to London, with introductions to sir Joshua Reynolds, he was kindly received by him, and practiced in his studio for about two months. Sir Joshua very soon perceived the high talent evinced by the young artist; advised him to visit Rome, and offered him funds for the purpose. Acting on this advice—he had funds sufficient—Raeburn set out, furnished with letters from Reynolds to Pompeo, Battone, and other artists of note in Rome at the time. After remaining two years in Italy, he returned, and settled in Edinburgh in 1787, where he soon received full employment as a portrait-painter. In 1812 Raeburn was elected president of the society of artists in Edinburgh; in 1814, associate of the Royal academy of London, and in the following year, academician. He was knighted in 1822, when George IV. visited Scotland, and shortly after was appointed king's limner for Scotland. He died at Edinburgh on July 8, 1823. Raeburn's style was modeled in a great degree on that of Reynolds—he aimed, like him, in his pictures to produce breadth—which is the effect obtained by massing together and keeping as far as possible the lights distinct from the shadows, and making them respectively effective, in place of dividing and mixing them up all over the picture; but he carried out this principle in a manner and with a feeling peculiarly his own. He never attempted, by thick impasto and semi-transparent painting, to produce texture and luminous effect, but adopted the opposite mode of painting in a low tone with a sharp touch, working his colors with little admixture of any unctuous medium. In his portraits of men, in particular, he gives the characteristic expression in a simple but decided and effective manner. His style has been thought by connoisseurs to resemble in many respects that of Velasquez. Raeburn's reputation was very high in his lifetime, and it is still rising, his pictures being now much sought after. Among the notable personages who sat to Raeburn for their portraits were sir David Baird, sir Walter Scott, Henry Mackenzie, Neil Gow, Harry Erskine, Dugald Stewart, prof. Playfair, Francis Jeffrey, Henry Cockburn, and many Scottish nobles. An exhibition of his works was held at Edinburgh in 1876.

RAFFAELLE. See RAPHAEL, *ante.*

RAFFLES, THOMAS, D.D., LL.D., 1788–1863; b. London; studied theology at Homerton college; in 1809 settled as pastor of the Independent church at Hammersmith, and in 1812 as successor of the gifted Thomas Spencer at Great George street chapel, Liverpool. He resigned his charge in 1860. He was eminent among the Independents as a theologian and preacher. He published *The Life and Ministry of the Late Thomas Spencer*, which passed through many editions; *Letters during a Tour through some parts of France, Savoy, Switzerland, Germany, and the Netherlands; Lectures on Christian Faith and Practice;* and many hymns.

RAFFLES, Sir THOMAS STAMFORD, a distinguished traveler and naturalist, was the son of a captain in the West India trade, and was b. at sea, off port Morant in Jamaica, on July 5, 1781. His first appointment was to a clerkship in the East India house. Having attracted the notice of his superiors by his talents and industry, he received a permanent appointment in the office. In 1805 the court of directors determined on sending out an establishment to Penang or Prince of Wales' island, and young Raffles was appointed assistant-secretary. He arrived at Penang in September of the same year; and having studied the Malay language with great diligence during the voyage, he was enabled to enter upon his duties with efficiency on his arrival. He continued his study of the Malay and other eastern languages, in which he made considerable progress. Eventually Raffles was made principal secretary. In 1808 he made a voyage to Malacca, where he had the opportunity of mixing with Javanese, Amboynians, Borneans, Papuans, Cochin-Chinese, and Chinese proper. With respect to Malacca itself, he collected much interesting information. In 1811, when it was resolved by the English government to take possession of Java, then belonging to the Dutch, it was arranged that Mr. Raffles should accompany the expedition as secretary to the governor-general, lord Minto, who was himself to take the chief command. After some hard fighting the troops took possession of the island. Mr. Raffles received the appointment of lieutenant-governor of Java and its dependencies; and, upon the departure of lord Minto, took upon himself the entire administration of the newly-acquired territory. Much had still to be done in the way of conciliating the native princes and chiefs to the British rule. He had to appoint British residents at several of the native courts, and to frame rules and regulations for their conduct. He ordered a general survey to be made of the whole island, the reading of which, as well as of all the reports connected with that and other things, occupied a considerable part of his time. By frequent personal interviews with the natives also he sought to become acquainted with their manners and character, and to make such regulations as would be for their best interests, both morally and materially. While engaged in this career of usefulness his health gave way; and in 1816 he returned to England, stopping by the way at St. Helena, where he had an interview with Napoleon. On his arrival in England he wrote his well-known *History of Java*, published in two volumes 4to in 1817, in which year he received the honor of knighthood. Java having by this time been restored to the Dutch, sir Stamford Raffles was appointed lieutenant-governor of Bencoolen, a settlement upon the coast of Sumatra, where he landed in March, 1818. In the latter part of that year he was called to Calcutta, on a visit of business, and instead of returning directly to Bencoolen, was sent to form a new settlement at Singapore. Here he remained for some months, and then again returned to Bencoolen, where he continued to discharge the duties of lieutenant-governor until Feb., 1824, when he was compelled by ill health to return to England. The vessel in which he set sail took fire, the crew and passengers escaping with difficulty in the boats. By this accident sir Stamford Raffles lost the greatest part of his effects, including a fine collection of natural history, and other things, valued at about £20,000. After his arrival in England he lived to carry out what had been one of his favorite projects—namely, the formation of the zoological society of London, of which he was named president, and to the interests of which he devoted himself to the time of his death. This took place on July 5, 1826.

RAFFLESIA, a remarkable genus of plants belonging to the small natural order *rafflesiaceæ*, an order composed entirely of parasitic plants, which consist merely of a flower, and form part of the *rhizogens* (q.v.) of Lindley. The *rafflesiaceæ* are natives partly of the Indian islands and partly of South America. The plants of the genus *rafflesia* have neither stalk nor leaves, but are mere flowers seated upon the roots of species of *cissus*, making their appearance at first as a hemispherical swelling of the bark of the root, and, after the bark has broken, rising up in the form of a head of cabbage, whilst the perianth is covered with imbricated bracteæ, which are more or less recurved after it has opened. The perianth is thick, fleshy, and 5-partite. The germen is inferior, and contains many ovules; and the anthers, which are numerous, are seated under the revolute margin of the top of the style column. After the flower has expanded, it diffuses a carrion-like smell, that even attracts flies, and induces them to deposit their eggs. The largest and first-discovered species, *R. Arnoldi*, was discovered in 1818 in Sumatra by Dr. Arnold, and was sent to the eminent botanist, Robert Brown, by sir Thomas Stamford Raffles, the British governor in Sumatra. Its flower measures fully 3 ft. in diameter, is capable of containing almost two gallons of fluid, sometimes weighs 10 lbs., and is the largest of all known flowers. A smaller species, *R. patma*, whose flowers are 16 in. to 2 ft. in diameter, is highly prized by the Javanese as a medicine, for its strong styptic powers. *R. Horsfieldii*, another Javanese species, is still smaller, its flowers being only 3 in. broad.

RAFN, KARL CHRISTIAN, a celebrated Danish critic and archæologist, was b. at Brahesborg, in the island of Fünen, Jan. 16, 1796, and educated at the university of Copenhagen, of which he was appointed sub-librarian in 1821. Even while a boy at the gymnasium of Odense, he was distinguished by his fondness for the old Norse literature and language, and when he became officially connected with the university, he undertook a general revision of all the Icelandic and old Norse MSS. preserved there. It is to Rafn's unwearied exertions that Denmark owes the foundation (1825) of the "Society for Northern Antiquities," whose principal object is the publication and criticism of all documents that can throw light on the subject of old Norse literature. To this single end Rafn devoted his whole life. As secretary of this society he edited and published a great many ancient Scandinavian MSS., occupying about 70 volumes. Among his numerous important works, we may mention a Danish translation of Norse Mythic and Romantic Sagas (3 vols., 2d ed. 1829–30); an edition (from a manuscript), with philologico-critical remarks, of Ragnar Lodbrog's death-song, under the title of *Krákumál, seu Epicedium Ragnaris Lodbroci, Regis Daniæ* (Copenh. 1826); a complete collection of the Norse sagas (many of these MSS. being hitherto unedited) entitled *Fornaldar-Sögur Nordlanda* (Copenh. 3 vols., 1829–30); and the *Füreyinga-Saga* (1832) in Icelandic, with translations in Danish and Faroese, and a critical apparatus. But his most widely-known and perhaps his most interesting work is his *Antiquitates Americanæ, seu Scriptores Septentrionales Rerum Ante-Columbianarum in America* (Copenh. 1837), in which, from a critical examination of numerous geographical, nautical, and astronomical data in certain Old Norse MSS., he comes to the conclusion that America was discovered by Norsemen in the 10th c., 400 years before Columbus was born; and that from the 11th to the 14th century a large tract of the North American coast had been visited and even partially colonized as far s. as Rhode Island and Massachusetts—a conclusion, it may be added, the probability of which has been confirmed in several important points by recent topographico-antiquarian researches in these states. The subject was followed up by him and Finn Magnussen in their *Historical Monuments of Greenland* (3 vols., Copenh. 1833–45). Another very important work to which Rafn furnished a great part of the text, carefully worked up from MSS., and a Danish translation of the first three and the 11th books in parallel columns, is the great collection of historical sagas representing events that took place out of Iceland, and entitled *Forumanna Sögur* (12 vols., Copenh. 1828, et seq.). He has also had a great share in drawing up and editing the Icelandic MSS. relating to the history of Russia and other eastern countries, and of which two volumes appeared at Copenhagen in 1850–52, under the title of *Antiquités Russes*. Rafn died at Copenhagen, Oct. 20, 1864.

RAFTERS, the sloping timbers of a roof (q.v.) which meet in an angle at the ridge, and on which rest the laths or boarding which carry the tiles or slates.

RAGGED SCHOOLS. The ragged school, as distinct from the certified industrial school, is a voluntary agency providing education for destitute children, and so preventing them from falling into vagrancy and crime. Vagrant children, and those guilty of slight offenses, are provided for in the certified industrial school; but the two institutions are frequently combined. See article INDUSTRIAL SCHOOLS. The movement which established ragged schools was almost simultaneous with that which instituted reformatories. John Pounds, a poor shoemaker at Portsmouth, has the honor of originating the idea. For 20 years, up to the time of his death in 1839, he gathered the ragged children of the district round him as he sat at work. They came freely, and were taught gratuitously. The success attending his humble efforts soon led many more influential friends of the "outcasts" to engage in the same work. In 1838 London had a ragged

Sunday-school, which eventually became a free day-school. Field Lane followed in 1843. But the first ragged feeding-school was opened in 1841 by sheriff Watson, in Aberdeen. In 1845 Dr. Robertson, not then aware of the existence of sheriff Watson's, opened a similar school in the Vennel, Edinburgh. Soon afterward Dr. Guthrie's famous *Plea for Ragged Schools* appeared, a work which gave an irresistible impetus to the movement, and caused the author to be generally regarded as the father of ragged schools. After this ragged schools spread over all the land, until there was scarcely a town of any importance that had not one or more. The recent education acts, however—that for England, 1870, and that for Scotland, 1872—introduced the principle of compulsory attendance at school; under this provision, a large number—especially in England—of such as were merely free day-schools have become public schools. But as the education acts make no provision for feeding the children, the managers of feeding-schools find themselves compelled to continue their efforts. In places where the system has been efficiently conducted juvenile crime has sensibly diminished. The governor of the Edinburgh prison has stated frequently in his reports, that since the establishment of ragged schools, the number of young persons committed to prison has gradually decreased. It may be mentioned that in one large ragged feeding-school, where in the course of 10 years 4,000 children have been enrolled, only 7 deaths have occurred during the period of school attendance. The ragged schools do not receive government aid. The capitation grant of £2 10s., allowed by a privy council minute in 1856, was withdrawn in 1859.

RAGGEE, *Eleusine corocana*, an Indian grain (see ELEUSINE), very prolific, but perhaps the least nutritious of the cereals, although it is the chief food of the poorer classes in Mysore and on the Neilgherries. It is made into dark-brown cakes and porridge, which are described as very poor fare.

RAGHU is, in the legendary history of ancient India, the name of a celebrated king of Ayodhyâ. See OUDE. He belonged to the royal dynasty which derived its origin from the sun; and among his descendants is Râma (q.v.). See also the next article.

RAGHUVANS'A (from *Raghu* (q.v.) and *vans'a*, race or family, hence "the family of Raghu") is the title of one of the most celebrated poems of Sanskrit literature, attributed to the authorship of Kâlidâsa (q.v.). It consists of 19 sargas—i.e., sections or cantos—and its subject-matter is the legendary history of the kings of the solar race, beginning with that of Dilîpa, the father of Raghu, and ending with that of Agnivarn'a. The text of the poem, with an excellent Latin translation of it, was published by prof. A. F. Stenzler (London, 1832); the text, with a prose interpretation in Sanskrit, by Pandits of the Sanskrit college of Calcutta (1831); and the text with the complete and important commentary of Mallinâtha, by Girîs'achandra Vidyâratna, one of the professors of the government Sanskrit college (Calcutta, 1852). Single cantos with the same commentary have also been published at Bombay and Madras.

RAGLAN, Lord, FITZROY JAMES HENRY SOMERSET, Field-marshal, G.C.B., eighth son of the fifth duke of Beaufort, was b. Sept. 30, 1788. He entered the army in his 16th year, and in 1807 served on the staff of the duke of Wellington in the expedition to Copenhagen. He went to the Peninsula as aid-de-camp to the duke, and in 1812 became his military secretary. As lord Fitzroy Somerset, his name became a household word. He was present at all the great actions of the Peninsular campaign which illustrate the career of the great commander. He was among the first to mount the breach at the storming of Badajoz, and it was to him that the governor gave up his sword. On the return of Napoleon from Elba, he served under the duke in Flanders, and lost his sword-arm in the crowning victory of Waterloo. The very next day he was seen practicing writing with his left hand! For his brilliant military services he was made K.C.B., and received orders from several foreign potentates. He was minister-plenipotentiary at Paris in 1815, and secretary to the French embassy from 1816 to 1819. The duke was appointed in 1819 master of the ordnance, and Raglan again became his secretary. In 1822 he went to the congress of Verona in attendance on the duke, who was the English plenipotentiary. In 1827 the duke was appointed commander-in-chief of the British army, and called Raglan to the horse-guards as his military secretary. This office he held until the death of his chief in Sept., 1852. He was then made master-gen. of the ordnance, and in October was called to the house of peers as baron Raglan of Raglan, in the co. of Monmouth. He had previously sat in the lower house during the parliaments of 1818 and 1826 for the borough of Truro. While master-gen. of the ordnance, he was appointed, with the rank of gen. while so employed, commander of the English forces which were dispatched to Turkey in Feb., 1854. The allied armies of Britain and France, under Raglan and marshal St. Arnaud respectively, made good their landing in the Crimea. The victory of the Alma, the flank-march to Balaklava (q.v.), the cavalry charge which has made that place immortal, the sanguinary and desperate infantry-battle of Inkermann (q.v.) (which obtained for Raglan the baton of field-marshal), and the siege of Sebastopol, are too well known to need description. Unfavorable comments began to be made, as the campaign proceeded, upon Raglan's conduct of the war. During the winter, 1854–55, his soldiers suffered unspeakable privations, and hundreds perished in camp and on board transports for want of the food, clothing, and medicines which were in store, but could not be found in the confusion and mismanagement that prevailed. Supplies arrived; but the siege continued without much apparent success until June 18, when a general assault was ordered, and when Raglan's troops, as well as the French, received a terrible repulse. Raglan had been suffering from a slight attack of cholera, and the disaster of June 18 weighing upon his mind, he suddenly became worse, and died of exhaustion, June 28, 1855. His remains were brought to England, and buried in the family cemetery at Badminton. Raglan was an indefatigable and experienced administrator. He proved himself to be a skillful tactician, although it may be doubted whether he had the qualities of a great general. He was undeniably gifted with many qualities that shone with great luster in the field as well as in council. His demeanor in action was so calm that it excited the admiration of the French, and marshal St. Arnaud declared that his bravery rivaled that of antiquity. His courteous and noble bearing, his gentleness of temper and firmness of mind, and his constant worship of "duty," invest his character with something of the chivalrous. See Kinglake's *Invasion of the Crimea.*

RAGMAN ROLL (*ragman*, a word of uncertain origin; used in ancient diplomatic language for an indenture or legal deed), the name given to the collection of instruments which record the acts of the fealty and homage performed by the Scottish nobility and gentry to Edward I. of England during his military progress through Scotland in 1296, and afterward at the parliament held at Berwick. The original instruments of homage under the seals of the parties were deposited in the royal treasury of England, and have almost entirely perished; but the roll in existence in the Tower preserves a record of them. Its contents were given in an abridged form in Prynne's *Records*, and afterward printed *in extenso* by the Bannatyne club in 1834. An especial value attaches to the Ragman Roll as containing the largest and most authentic enumeration extant of the nobility, barons, landholders, and burgesses, as well as of the clergy of Scotland, prior to the 14th c., and the only genuine statistical notices of Scotland of the period.

RAGOÛT (Fr. *ragoûter*, to revive the appetite; appears to be from Lat. *re-ad-gustare*), a name much less in use now than formerly, for a dish of stewed meat and vegetables, usually flavored with herbs and other condiments. It differs but little from the olla of the Spaniards, and the pilau of the Turks.

RAGS. Fragments of nearly all textile materials have now a commercial value; those of cotton, linen, and hempen cloths are used in the manufacture of paper (q.v.); and woolen and worsted rags are made available for respinning either alone or mixed with fresh wool, while the refuse is ground into powder, dyed various colors, and forms the material called flock, used by the paper-stainers to produce their ornamental flock-papers. The trade in rags is enormous. Linen and cotton rags to the extent of from 15,000 to 16,000 tons per annum, of the value of nearly £300,000, are now imported by British paper-makers, and perhaps quite as large a quantity is collected at home. The greatly increased use of esparto makes the import of rags of less cardinal importance than it used to be to the paper-makers of this country. See **SHODDY**; and **RAG-TRADE**.

RAG TRADE. This trade, even within the limits of a generation, has undergone extraordinary changes. Woolen rags, which some 30 years ago were all allowed to rot on the dunghill, save the very small quantity required for flock papers and stuffing saddlery, are now consumed, under the name of "shoddy," to a vast extent in the manufacture of the cheaper woolen cloths, more than 30,000 tons having been imported in 1872; and in the same year, probably a like quantity was obtained in Great Britain itself.

Linen and cotton rags are, as is well known, nearly all consumed in the manufacture of paper; but of late years the demand for paper has increased at so great a rate, especially for the American and colonial markets, that rags can no longer be looked upon as the principal raw material from which it is made. It was stated by Mr. Routledge, to whom the country is mainly indebted for the successful introduction of esparto fiber, at a meeting of the London society of arts, in Dec., 1871, that rags were now used alone only for the paper of bank-notes, ledgers, and such-like special purposes, esparto fiber being even preferred as a material for printing-paper. Wood pulp is also largely used on the continent, as well as in America, to mix with rags for all kinds of papers, often forming as much as 70 per cent of their weight. For some time past the amount of cotton and linen rags annually imported into Great Britain has been below 20,000 tons; while the imports of esparto and other vegetable fiber reached, in 1876, the amount of 130,911 tons. Moreover, no less a quantity than 22,925 tons of rags and other paper-material, but chiefly rags, were exported from British ports, nearly the whole of which went to the United States.

Unfortunately, there seems but too much reason to fear that the regular supply of esparto, as the staple material for paper, cannot be depended upon; and even though it could, rags will always be of great value for the better kinds. Mr. William Arnot, in a lecture delivered before the society of arts, London, in Dec., 1877, estimated the quantity of paper annually consumed in different countries as follows: In Russia, 1 lb. per head of the population; Spain, 1½ lb.; Mexico and Central America, 2 lbs.; Italy and Austria, 5 lbs.; France, 7 lbs.; Germany, 8 lbs.; United States, 10¼ lbs.; and Britain, 11¼ lbs. Britain had 385 mills, producing annually 360,000 tons of paper, valued at £20,000,000. When the continent had more rags than it required, England and America had to import rags to keep their mills going. The state of matters is still the same as regards the continent; but, in the mean time, the increased use of esparto appears to admit of England sending away as many rags as she imports. Most of the imported linen rags come from Germany and France. Cotton, flax, and jute waste from spinning-mills are all used for paper-making.

It is believed that the home supply of linen and cotton rags might be largely increased by greater care in housekeeping economy. Mr. Herring, partner in a firm of paper-merchants, and author of several articles on this branch of industry, published in 1860 a "letter," addressed to clergymen and others, suggesting an organized plan for the attainment of this object. "There are," he remarks, "more rags wasted, burned, or left to rot than would make our paper-manufacturers independent of all assistance from abroad." Whatever may have been the case in 1860, it is plain that, however carefully collected, all the rags produced in Great Britain would now be far short of meeting the demands of our paper-mills if no other material were used.

The managers of the ragged schools in London organized a *rag-collecting brigade* in 1862 for the systematic collection of the rags of the metropolis.

RAGU'LY, in heraldry, a term applied to an ordinary whose bounding lines are furnished with serrated projections.

RAGU'SA (Slav. *Dubrovnik*, Turk. *Paprovnik*), formerly an independent republic, now a decayed episcopal town and sea-port of Austria, in the crown land of Dalmatia, lies at the base and on the steep slopes of mount Sergio, 40 m. w.n.w. of Cattaro. Its higher streets communicate with its lower by means of flights of steps. It is surrounded on the land side by double walls, surmounted by old towers. Immediately s. of the town is a harbor, which admits only small vessels; but 2 m. w. is Gravosa, the proper harbor of Ragusa, and which offers secure and spacious accommodation to the largest vessels. The trade of Ragusa, which was once extensive and profitable, has sunk, and its inhabitants, 6,000 in number (about a sixth of the former population), support themselves by the manufacture and export of oil (very excellent), soap, liquors, malmsey wine, silk, leather, and tobacco. Ragusa also carries on a considerable transit trade with Turkey by means of the Turkish caravans, about 200 of which—in all about 7,000 horses—visit the town annually.

Ragusa is supposed to have been founded in 656 by refugees from Old Ragusa (the ancient *Epidaurus*, situated 10 m. s.e.), which was at that time destroyed by a tribe of Slavonians. It formed itself, after the model of Venice, into an aristocratic republic, governed by a rector. In 1358 it placed itself under the protection of Hungary, and later it became tributary to the porte. Napoleon in 1808 abolished the republican government of Ragusa, and incorporated the town with the province of Dalmatia. After 1814 the town, together with the province, came into the possession of Austria.

RAGUSA, an old t. in the s. of Sicily, in the province of Syracuse, and 30 m. w.s.w. of the city of that name, stands on a narrow and steep ridge between two ravines, on the right bank of the Ragusa, and about 15 m. from the sea. In the cliffs below the walls and around the town ancient tombs of various shapes have been hollowed out. Ragusa is supposed to occupy the site of the ancient *Hybla Minor*. Pop. '72, 21,546, who manufacture cotton, woolen, and silk goods.

RAGWORT, the common English name of those species of *Senecio* (q.v.) in which the heads of flowers have a spreading ray, the involucre has small scales at the base, and the leaves are pinnatifid. The British species are large coarse weeds, with erect stem, and yellow flowers; one species, the COMMON RAGWORT (*S. Jacobæa*), a perennial, is too plentiful in many pastures. It is refused or disliked by horses, oxen, and sheep. It generally disappears from thoroughly drained land, at least after a little labor has been expended in grubbing up its roots. The fresh herbage has been used to dye wool green, but the color is not permanent.

RAG-STONE, an impure limestone, consisting chiefly of lime and silica, much used in Kent. It breaks up into pieces about the size of a brick, and is hard and flat-bedded. The name is also applied to the hard irregular rock which frequently overlies better building materials. Besides being used for building purposes, hones or sharpening stones for scythes and other large blades are made of it.

RAHDUNPUR', a large fortified t. of Hindustan, in a protected state of the same name, in the n.w. of Guzerat, about 150 m. n.w. of Baroda. The majority of the inhabitants, who are chiefly Rajputs and coolies, are engaged in agriculture; trade and manufactures, however, are carried on to some extent. Coarse cotton cloths—the staple manufacture—and grain, leather, and hides are exported. Pop. 15,000. The state of Rahdunpur, which is under British protection, has an area of 850 sq.m., and a pop. of 91,500. The climate, very hot during October and November, is delightful from December to April.

RAHU is, in Indian mythology, the demon who is imagined to be the cause of the eclipses of sun and moon. When, in consequence of the churning of the milk-sea, the gods had obtained the amr'ita, or beverage of immortality, they endeavored to appropriate it to their exclusive use; and in this attempt they had also succeeded, after a long struggle with their rivals, the Daityas, or demons, when Râhu, one of the latter, insinuating himself among the gods, obtained a portion of the amr'ita. Being detected by the sun and moon, his head was cut off by Vishn'u; but the amr'ita having reached his throat, his head had already become immortal; and out of revenge against sun and moon, it now pursues them with implacable hatred, seizing them at intervals, and thus causing their eclipses. Such is the substance of the legend as told in the *Mahâbhârata* (q.v.). In the *Purân'as* (q.v.) it is amplified by allowing both head and tail of the demon to ascend heaven, and produce the eclipses of sun and moon, when the head of the demon is called *Râhu*, and his tail *ketu*, both, moreover, being represented in some *Purân'as* as the sons of the demon *Viprachitti* and his wife *Sinhikâ*. In the *Vishn'u-Purân'a*, Râhu is also spoken of as the king of the meteors.—In Hindu astronomy Râhu is personified as the moon's ascending, and ketu as the moon's descending, node.

RAHWAY a city of New Jersey, on the Rahway river, 5 m. from its mouth, and the New Jersey railway, 19 m. w. of New York. It contains numerous manufacturing establishments, a large proportion of which are for carriages. Pop. '60, 7,130; '70, 6,258.

RAIKES, ROBERT. See SUNDAY-SCHOOLS.

RAIL, *Rallus*, a genus of birds of the order *grallæ*, and family *rallidæ*, having a slender bill, longer than the head, the body of a very compressed form, wings of very moderate length, a very short tail, long and strong legs, and long toes. The only European species is the COMMON RAIL or WATER RAIL (*R. aquaticus*), sometimes called *bilcock*, a bird which occurs in almost all parts of Britain, and is not unfrequent in marshy situations and the reedy margins of lakes and rivers, although it often eludes observation, threading its way among reeds—for which its compressed form seems specially adapted—and diving when compelled to betake itself to open water. It does not rise, except in extreme necessity; and when flushed, flies heavily. It is more plentiful in most parts of the continent than in Britain; and is there generally a bird of passage, breeding in the north, and migrating southward on the approach of winter. It makes its nest of coarse grass and sedges among thick aquatic plants. The whole length of the bird is about eleven inches and a half. The sexes are very similar in plumage, olive-brown, marked with black above; bluish-ash color beneath, with white transverse markings on the belly. The water-rail feeds on worms, mollusks, and soft vegetable substances. It is in the highest esteem for the table.—America produces a number of species of rail, as the VIRGINIAN RAIL (*R. Virginianus*), a species rather smaller than the water-rail of Europe, and much resembling it in its habits; a bird of passage, and in many parts of North America very abundant; the GREAT RED-BREASTED RAIL, or FRESH-WATER MARSH HEN (*R. elegans*), a much larger bird, fully 20 in. in length, inhabiting the extensive marshes of the southern states of North America; the CLAPPER RAIL, or SALT-WATER MARSH HEN (*R. crepitans*), extremely abundant in the salt-marshes of the same regions, its whole length about 15 in.; all of which are much esteemed for the table, the eggs of the clapper-rail being also collected in great numbers as a delicacy. The name clapper-rail is from the cackling cry which the bird seems to delight in emitting.—The MANGROVE HEN (*R. longirostris*) abounds on the muddy shores of the West Indies, and its flesh is held in the highest esteem.—In general form, and in the character of their plumage, all these and other species are very similar.

RAILS, in architecture, are the horizontal bars in paneled stone or wood work, such as doors, shutters, etc., which inclose the panels, the upright pieces being termed styles. —The word is also applied to the level piece over balusters or between posts.

RAILWAYS. The origin of these now vast undertakings is traced to a contrivance for simplifying the transit of coal from the mines in Northumberland and Durham to the places of shipment on the Tyne and Wear. The invention consisted of a double parallel line of wooden beams or trams fixed to the ground, and furnished with flanges to prevent the wheels of vehicles from slipping aside. Along these flanged beams wagons were drawn by horses with such comparative ease that instead of a load of 17 cwt. by a common road, a load of 42 cwt. could now be drawn by a single horse. These new thoroughfares, called tramways, were made across fields, the proprietors of which received a certain rent for the way-leave or use made of them—which term, way-leave, is still employed in arrangements of this kind. To the coal districts of the n. of England, therefore, is indisputably due the simple yet meritorious contrivance which, from less to more, led to the modern railway, with all its wonderful machinery; nor is it useless to note that the invention, in its early stages, owed nothing to men of education or high scientific attainments, but was mainly the work of obscure mechanics and illiterate enthusiasts

The date of the invention of tramways is uncertain, but by good authorities it is referred to the period between 1602 and 1649. From the northern coal districts it gradually came into use in other mining districts in England, as also in the s. of Scotland. The 17th c. was not favorable to mechanical improvement. Not till about 1700 was there any marked advance on the original tramway. The first step was the clothing of the wooden beams with long slips of iron, to prevent excessive tear and wear. This also being found defective, a second and more complete improvement, about 1740, was the substitution of cast-iron rails fixed in parallel lines on cross wooden sleepers. This species of railway became pretty general in mining districts between 1745 and 1775. In the former of these years, one was in operation in Scotland—namely, a short coal-line from Trament to Cockenzie, which gen. Cope selected as a position at the battle of Prestonpans. Though now considerably improved, railways did not attract attention as being suitable for general traffic. The success of canals not only turned the public mind in that direction, but raised up a powerful canal interest, which viewed the progress of railways with extreme jealousy and ill-will.

The use of cast-iron rails led to an improved method of traction. Instead of employing a single large wagon, the plan of linking together a series of smaller wagons was adopted—the germ of the modern train. The next improvement consisted in putting flanges on the wheels instead of the rails, by which great facility of transit was afforded. The draught still continued to be executed by horses; but as the railway system seemed to possess immense capabilities of expansion, many minds labored in devising schemes to substitute steam-apparatus. The invention of the locomotive, like that of railways, was the work of successive geniuses. Watt had shown the practicability of fixed steam-engines; what was now wanted was an engine that would travel by its own internal impulse. The merit of inventing a self-acting steam-carriage is allowed to be due to Richard Trevethick, a clever but eccentric engineer. In 1802 he took out a patent for a steam-carriage, and this novel machine he exhibited to large crowds of admiring spectators on a piece of ground near London. Immediately afterward he adapted his carriage for the drawing of wagons on railways, a duty which it successfully executed on the Merthyr-Tydvil railway in 1804. This was the first locomotive; but it was far from perfect. It drew only 10 tons of bar-iron at the rate of 5 m. an hour. Trevethick did not remain in England to improve on his invention, nor did the moderate achievements of his machine immediately induce others to make any distinct advance on his ingenious contrivance. For this lethargy there were various causes; but the principal consisted in a universal belief among engineers, that the locomotive could not be expected to gain great speed, to ascend a moderate incline, or to draw a heavy load, unless the wheels were provided with a cogged rim to work on a corresponding rack along the rails. Numerous schemes were made the subject of patents to overcome this imaginary difficulty—a circumstance which gives one a poor opinion of the state of engineering knowledge at the beginning of the 19th century. That locomotives running with smooth wheels on smooth rails, by mere weight and friction, as exemplified by Trevethick, could draw heavy loads up a moderate incline, was at length, in 1811, established as a fact by Mr. Blackett, a coal-proprietor, on the Wylam railway. The means for imparting speed alone remained to be given.

Locomotive power was employed by George Stephenson (q.v.) on the Killingworth railway in 1814, and with such success, that it was afterward applied on the Stockton and Darlington railway, for which the first act of parliament was passed in 1821. In this last undertaking, Stephenson was encouraged by the generous and enlightened aid of Edward Pease, a member of the society of Friends, whose name will always be associated with the history of railway enterprise. The Stockton and Darlington was the first railway in which carriages traveled with passengers; yet, even with the measure of success so secured, the locomotive was still an imperfect machine, for its rate of progress continued to be little faster than the walk of a horse. Acceleration was now the grand desideratum, and it was attained by using a very simple contrivance—that of sending the waste steam up the chimney, so as to cause a powerful draught in the fire; a rapid generation of steam was the consequence, and by this appliance, along with the multitubular boiler, the machine shot forward with an energy hitherto unknown (see STEAM-ENGINE).

It certainly seems very strange that, notwithstanding the proved feasibility of railways, the public at large could not be stimulated to give any heed to the subject. It was shown in this, as in the analogous case of steam-boats, that the world may remain skeptical of an invention long after it has been practically established beyond cavil. The idea of extending railways over the kingdom for general traffic was perhaps first conceived by Thomas Gray of Nottingham, who, full of enthusiasm, besieged the public, and memorialized the government on this his favorite project, between 1820 and 1824. A work embodying his views, *Observations on a General Iron Railway, etc.*, was published in 1820. Gray's ardent notions met with little favor. Unfortunately, he was no mechanic, and, seemingly unacquainted with the advances which had been made, labored under the old exploded belief, that locomotives must have cogged wheels. After Gray, there appeared another projector, William James of London, who, in 1822, endeavored, without success, to establish a railway between Liverpool and Manchester. Opposition caused his plans to be laid aside. The next and more fortunate projector was Joseph Sanders of Liverpool. He issued the prospectus of a railway from Liverpool to Manchester, Oct. 29, 1824; and this line, surveyed by Stephenson, was, after much unworthy opposition, and some changes of route, sanctioned by the legislature. It was formally opened for traffic, Sept. 15, 1830. Provided with some of George Stephenson's improved locomotives, the success of the line was immediate and complete—in fact, the great railway system was inaugurated.

Now, properly speaking, began that course of commercial enterprise, unregulated, and often wasteful, which has since assumed such importance. Refraining from all control over railway operations, the government left speculators to carry lines anywhere or anyhow that parliament could be persuaded to sanction. The result, as is well known, has been in many places a complication of competing lines on no principle of economy or enlightened foresight. Abandoned, as it were, to the audacity of promoters, and the mere brute force of capital, schemes, good, bad, and indifferent, had to fight their way at a cost almost exceeding belief; while at the same time there has been much waste of money in allowing circuitous lines to places which are afterward, in a great measure, superseded by others more direct.

Legislation and Management.—In the United Kingdom railways are the property of independent companies, who construct and work them under the provisions of acts of parliament. The first step consists in organizing a company. Generally a solicitor and a few active projectors draw up a prospectus, call meetings, suggest the names of directors, and appoint an engineer to make a survey. In no case does government or any public body take any part in the initiatory proceedings, or find any part of the capital. By the engineer and solicitor there is much to be done at the outset. Having procured a copy of the survey, the solicitor has to discover the name of every proprietor whose land is interfered with, as well as every tenant or occupant; all which names, with the extent and nature of the land to be taken, are entered in a roll, called the *Book of Reference;* and, with every person so concerned, a schedule must be lodged, stating all particulars. The recipients of the schedules are requested to state in reply, whether they design to assent, to oppose, or to remain neuter; by which means the mind of every one territorially interested becomes known to the promoters. Land to be taken for, or damaged by, railways is valued under different categories: 1. The quantity and quality at so much per acre; 2. The injury caused by cutting off one part of a field from another, called intersectional or severance damages; and 3. The damage done to the amenity or beauty of the place. Besides claiming compensation on these different grounds, the proprietor demands, for the sake of convenient communication, that bridges or level crossings shall be made across the line, or that passages be left beneath it; also that all ordinary means of drainage be maintained by culverts. Sometimes he stipulates for a siding or station. Should the lands be let to a farmer, as is very generally the case, he is treated with separately for the loss he is likely to sustain during his lease, including any loss by unexhausted manure in the lands appropriated. Being thus compensated for his claims, the farmer continues to pay his rent as usual without deduction, according to the obligations of his lease, and any question is saved between landlord and tenant. Such is an outline of the usual method of settling "land-claims," though much depends on the feeling on both sides. At one time enormous sums were asked and paid for alleged damage to land; now, the claims are more moderate, and in few instances is damage to amenity an element of consideration.

Until a statutory enactment is procured, the shares of a company are in that embryo state called *scrip.* Allotted to applicants by the provisional directors, the shares are "taken up" by paying a small instalment of from 5s. to 20s. per share. These preliminary sums are paid into a specified bank, the receipt of which is the scrip or certificate that so frequently becomes the subject of eager transfer among jobbers. The bank deposits of the allottees constitute the fund from which are paid—1. Expense of survey; 2. Expense of advertisements, prospectuses, etc.; 3. Parliamentary expenses; and 4. The amount to be lodged with an officer of government as a guarantee that parliament shall not be troubled with a merely pretended scheme. Should the bill not pass, the sum last mentioned is returned, and is, along with any residue, divided *pro rata* among the holders of scrip. Should the bill become law, scrip-holders are required to present their names with the amount of their respective shares for register at the office of the secretary of the company. "Calls" are next made on the shareholders. If the shares be £10, a call of £2 10s. per share, at intervals of three months till the whole is paid, is customary. Any failure to pay calls by a prescribed day incurs the risk of forfeiture. In authorizing a company, parliament gives power to raise so much money by shares, and so much by borrowing. The amount that may be borrowed is equal to a third of the stock, but it cannot be legally borrowed until all the shares have been issued, and at least one-half of all the shares has been paid up. The lender has a mortgage over the whole property of the company, called a debenture (q.v.). The entire amount paid for shares and borrowed on mortgage forms the "capital account" of the company. See Capital Account, in which an explanation is offered of the manner of disbursing from capital and also from revenue; it being from revenue alone that dividends can be legally paid.

The act which authorizes the undertaking constitutes the company a corporation, the members of which are responsible only to the extent of their respective shares. In the act, the names of the first directors are given; it is also stated who are first to retire, and how elections are to be conducted. A director must possess a prescribed amount of stock. The directors are empowered to appoint from their number a chairman and deputy-chairman. They likewise have the appointment of secretary, traffic-managers, and other paid officials. The directors themselves profess to give their services without any species of remuneration; but the shareholders usually vote a small sum to be put at their disposal, adequate to meet absolutely necessary expenses. Where the duties are very onerous, a special allowance per annum is voted to the chairman. It is likewise customary for the directors to have free passes over the line, which privilege is also enjoyed by the secretary and some other officials. In some instances, a free pass for a day is given to the shareholders to enable them to attend the stated half-yearly or special meetings. The principal business at the half-yearly meetings is the reading and approval of the "report" of the directors. As the report is always printed and circulated previously, all are prepared to discuss its merits.

The organization of the present railway system has not depended on the private acts authorizing the several undertakings. There is now a body of general railway law, springing from a number of public acts, which have from time to time received the grave consideration of the legislature. These statutes date from 1838 onwards; some of the more important were passed in 1845; among these were several comprehensive statutes, including "The Companies Clauses Consolidation Act," and "The Companies Clauses Consolidation (Scotland) Act;" also "Railway and Lands Clauses Consolidation Act;" to which supplementary acts were added in 1863 (see Bigg's *General Railway Acts*). Among the diversity of matters treated of are as follows—obligations as to carrying mails, and conveyance of troops and police; regulations as to gates at level crossings, signals, and junctions; penalties for obstructing engines or railway officers, and trespassing on lines; limitations of gradients and curves; gauge; time within which railway must be made; notices to be given to board of trade before line can be opened, and not to be opened without authority, after due examination of works; returns to board of trade as to accidents; maintaining of fences; making of sidings for farming and other purposes; one cheap train to be run each way daily; rules for registering and transferring shares; voting according to ratio of shares held; payment of poor-rates and public assessments; leasing of lines; agreements to work lines; surrender of shares; authority to buy, hire, and use steam-vessels; etc.

Besides these public acts, there is a code of regulations as regards the mode of commencing and carrying railway bills through the houses of parliament. This code, embodied in a work issued annually, is styled *Standing Orders of the Lords and Commons relative to Private Bills* (1 vol. 12mo, issued by Waterlow and Sons, Westminster). With this, all parties engaged in procuring railway acts require to be well acquainted, for neglect of any of the prescribed forms is almost certain to be fatal. We give the following as specimens of "standing orders": Notices of applications for acts to be advertised in October or November; plans, sections, and books of reference to be lodged with the clerk of the peace or sheriff-clerk of county for public inspection, on or before Nov. 30 [often an immense struggle up till last moment to get this done]; petitions for act stating particulars to be lodged at the private bill office of the house of commons on or before Dec. 23; on or before same date, copy of proposed bill to be lodged with board of trade; on or before Dec. 31, declarations, lists of owners, lessees, and occupiers, also estimate of expense, to be deposited in private bill office; a sum not less than eight per cent of the estimated expense to be deposited with the court of chancery, England, an officer of the court of exchequer, Scotland, or court of chancery, Ireland, previous to Jan. 15; examination of petitions to commence on Jan. 18; if promoters do not appear after a notice of seven clear days, examiners may throw out petition; certification by examiners whether standing orders have been complied with; bill submitted to select committee; proceedings in opposed bills; report of board of trade on bill; report of board of admiralty on bill, should any tidal or navigable river be proposed to be interfered with; preamble of bill proved or otherwise; bill to give power for future revision by parliament, etc. There are equally explicit standing orders as regards the house of lords, whose chairman of committees subjects all private bills to a sifting examination. Whatever, therefore, may have been the negligence of the government at the outset, railway legislation has latterly received a painful degree of attention. As marking a desire for simplifying procedure and lessening expenses, parliament passed an act, 1864, giving the board of trade power to authorize bills for a smaller class of railways, provided they were unopposed—a concession which may promote a minor but useful kind of branch-lines.

In issuing the prospectus of a railway, an estimate is given of the probable amount of traffic of all kinds; but in every case, sometimes to a surprising degree, the traffic exceeds expectation. Railways have not improperly been compared to navigable rivers. To inland and not easily-reached towns they impart the character of a seaport placed in ready communication with all the world. The exciting of a desire to travel, and the developing of local trade and resources, accordingly attend on railway undertakings, and the consequence is a universal activity and prosperity, and the creation of wealthy industrial centers.

Railways were at first detached undertakings between one large town and another, but now many of the companies have for mutual advantage amalgamated in groups; and in a number of cases, for economy in working, lesser lines have been leased to companies of larger means. In this, as in most other commercial concerns in Great Britain, the tendency is to concentrate business in the hands of monopolists possessing large capital, or at least those having a great capacity and disposition to borrow. One of the advantageous results of a union of railway interests is, that passengers are able to procure "through-tickets" to carry them forward for hundreds of miles without delay or change of carriage; but it is not less conspicuous that the "railway interest" has become a formidable power in the state, and is able to carry lines almost anywhere, in disregard of land-proprietors or town-authorities, as if the destruction of rural amenity and the wholesale ruin of dwellings were matters of perfect indifference. Making every allowance, therefore, for the high social value of the railway system, it has certainly reached a point of despotic overbearance that requires some species of control more effectual than that which is embraced in the irregular action of parliamentary committees or of the board of trade.

This question has lately been attracting much attention. The government has tried in various ways to ameliorate the evils arising from its early apathy, and to control the excesses of railway enterprise. The latest of these efforts was the appointment of a joint committee of lords and commons, and a bill based on the report of that committee was in 1874 before parliament. One of the conclusions arrived at by this committee is worth noting: "That no means have yet been devised by which competition can be maintained. Nor is there any reason to suppose that the progress of combination will cease until Great Britain is divided between a small number of great companies."

Two great propositions for amalgamation made recently have been negatived by parliament. It remains to be seen whether the act will prove more successful than antecedent legislation. Its principal feature is the appointment of a mixed tribunal—composed of three eminent men—for the regulation and control of the working of railways.

The only alternative proposed to the present system is the government purchase of railways. An act of parliament was passed in 1844 for the purpose of enabling government to purchase all lines after they had respectively been 21 years in existence, dating from the passing of the act. This statute came into operation in 1865, but the joint committee of 1872 report that they do not think the terms of the 1844 act suited to the present condition of railway property, or ever likely to be adopted by parliament.

There is much to be said on both sides of this question; most of the arguments advanced *pro* and *con* may be found in articles respectively in the *Quarterly Review* and *British Quarterly Review*, April, 1873.

CONSTRUCTION.—Railways in the United Kingdom are of two kinds—double and single. The double consists of two lines of rails—an *up*-line, conducting toward, and a *down*-line, leading from the metropolis or principal center of traffic. By far the larger number of lines are of this double variety. Single lines, with places where trains may pass each other, are mostly of recent construction, and have received their chief development in Scotland. On some of the main lines to London it has been found necessary to add a third, and in some cases a fourth line to accommodate the enormously increased traffic. Whether double or single, all the lines are inclosed. At the chief terminus there is a group of buildings for offices, workshops, sheds for locomotives, etc. Within late years the terminal stations at the larger towns have assumed vast proportions, and in them comfortable waiting and refreshment rooms are provided. In many cases, also, hotels on a very large scale have been erected as part of the buildings at the termini.

The construction of a railway is the business of contractors, who execute the works by estimate, according to the plans and specifications of the engineers. A railway contractor is a capitalist with a practical knowledge of earth-digging, blasting rocks, pumping, embanking, boring and building tunnels, erecting bridges, and other rough operations. He possesses a stock of the various necessary apparatus, light rails, tools, etc., including horses, wagons, and locomotives for dragging materials. He has subordinates called time-keepers, foremen, gangers, and under-gangers, placed over detachments of operatives. These operatives are a remarkable class of men. Originally from Lincolnshire and Lancashire, they are popularly known as *navvies* (contracted from "navigators"), from having been engaged in excavating navigable canals. Navvies sometimes labor in bands called *butty-gangs*, by piece-work, and are known to draw large sums, but more generally they are employed at days' wages.

Signals.—The signaling arrangements form an important part of railway construction. The most common form of signal is the semaphore, and at night, colored lights. A red light signifies danger; a green, caution; and a plain light, that the line is clear. Much care is given to the arrangement and construction of crossings, junctions, etc., with their numerous *switches*, or movable rails, used for changing the direction of a train from one line to another. The *switches* are generally worked directly from the signal-stations, and are so arranged that their points shall *not* face toward the advancing traffic. Numerous accidents have been caused by "facing points." Many improvements have been lately introduced in signaling, crossings, etc., all with a view to increased safety. The "block" system has been adopted by the principal railway companies, particularly in the neighborhood of busy centers of traffic. Under this system each signal-station is in direct telegraphic communication with the nearest signal-stations, both up and down the line, and a train is not allowed to pass any signal-station until the train immediately preceding it has started from the next station in advance. Thus the driver may push on without hesitation from point to point; and thereby the traffic is expedited, and at the same time safety increased. The system of *interlocking* has also been extensively introduced. Under this system the pointsman can *only lower one* signal—namely, that which corresponds to the line which, from the position of the switches, is *clear;* and before he can alter the position of the switches he is compelled to return this signal to "danger."

Curves and Gradients.—Engineers endeavor to render their lines as level and straight as possible, but circumstances often necessitate the use of considerable curves and gradients. As a general rule there are few curves of less than three-eighths of a mile, or 30 chains' radius; when they are employed, the exterior rail is super-elevated, to counteract the centrifugal force, otherwise a quickly moving train might leave the rails. Gradients being expensive to work according to their degree of inclination, few are more steep than 1 in 60, though 1 in 30 is not unknown. On steep gradients, stationary engines were sometimes employed, but in nearly every case these have been abandoned for locomotive power. On local and private lines, much steeper gradients and sharper curves are common. One of the earliest, if not the first trial of a locomotive on an incline of 1 in 12, was made in Scotland in 1862, by Mr. George Gray, on his private line near Bathgate.

Gauge and Earth-works.—In the early stage of railway operations, the gauge or width between the raisl excited considerable discussion. When way-leaves, or tramways, were introduced in the coal districts, their gauge was adapted to the common road-wagons that were to be put upon them, and it happened that the gauge between the wheels of these wagons was 4 ft. 8½ inches. Accustomed to this width, George Stephenson believed that it "was most economical in construction, not only as regarded the engines and carriages, but more particularly of the railway itself." This gauge was accordingly adopted on most of the earlier-made railways, and, notwithstanding the keen contests of engineers, who were generally favorable to a 5 ft. or 5 ft. 3 in. gauge—Brunel contending for 7 ft.—this original 4 ft. 8½ in. gauge—measured from the inside of one rail to the inside of the other—was irrevocably fixed by a public act, 1846, as applicable to all the railways in England and Scotland, the Great Western and certain branches excepted, on which the gauge was regulated at 7 feet. Owing to inconvenience in communicating with other lines, and from other causes, the Great Western has found it advisable to conform to its neighbors, and has now relaid its lines on the standard gauge. By the same act, the gauge in Ireland was fixed at 5 ft. 3 inches. The government of India fixed the gauge of all the railways in that country at 5 ft. 6 inches. But a movement in an opposite direction has set in within the last few years, and the battle of the gauges is renewed. A horse tramway at Festiniog in Wales, constructed in 1832 for the conveyance of slates from a quarry, and laid with a 1 ft. 11¾ in. gauge, was, in 1863, transformed into a locomotive railway for passengers and goods, and was found to work with perfect safety, and with remarkable economy. The success of this experiment has awakened the attention of many engineers to what they believe to be the needless extravagance of the standard gauge; and railways with gauges varying from 2 ft. 6 in. to 3 ft. 6 in. are now in operation in the Isle of Man, Norway, Sweden, Russia, Queensland, Peru, Chili, Brazil, Canada, and the United States, where a vast mileage is built or in course of construction. The great argument for the narrower gauge is the obvious economy both in first cost and in working. It is calculated that, on an average, companies have to haul over their lines seven tons of dead-weight in order to carry one ton of goods; and in the case of passenger carriages the excess is even greater. With the whole apparatus on a smaller scale, this waste is greatly reduced. Another advantage of the narrow gauge is, that much sharper curves may be adopted than are possible on the broader one, and thus the route may be chosen to much greater advantage. While it may be an open question whether the narrow gauge is adequate for a thickly peopled district, where "express" trains may be indispensable, and where traffic may at times be exceptionally heavy, it is, without doubt, especially suitable for sparsely peopled districts and half-developed territories. Indeed, it affords the means of supplying the benefits of railway communication where otherwise they would be hopeless. After careful investigation, the Indian government of the late lord Mayo decided to adopt the meter gauge, about 3 ft. 3 in., for the greater part of an extensive series—1500 m.—of state railways, and considerable progress has already been made in their construction. In Canada there are already 5,230 m. of narrow-gauge railway.

Ballast.—This is the name given to the mass of broken stones or dry gravel on which the sleepers are placed, and which serves to keep them steady. Material for ballast is generally got in the cuttings or near the line, but is often brought a considerable distance. The term *ballast* originated in the practice of using the gravel-ballast emptied from the ships in the Tyne, for the tram and railways in the neighborhood of Newcastle.

Rails.—Rails are generally of wrought iron, but steel rails have been extensively adopted where there is a continuous heavy traffic, and are found to reduce greatly the cost of maintenance, and promise to supersede wrought iron. Rails differ in shape and weight. The most common form is the "double-headed" rail, which is reversible. Another form, which was once used on the Great Western for the broad-gauge line, is known as the "bridge-rail;" and a form frequently used on the continent, and generally on narrow-gauge lines, has a flat base formed by a flange on each side of the vertical web. The last two descriptions do not require *chairs*, but are fastened directly to the sleepers by spikes. Rails are generally 21 or 24 ft. long, and for light railways vary in weight from 20 to 45 lbs., and for heavy lines from 60 to 80 lbs. per lineal yard. Cross-sleepers are laid at 2 ft. 6 to 3 ft. 6 in. apart, usually about 3 ft., and on these sleepers the *chairs* of cast-iron are fixed and held firmly down by iron spikes driven into the sleepers. The ends of the rails are now almost always joined together by a plate of malleable iron placed on each side, called a fish-plate; two of these are used at each joint, and are bolted together by strong bolts passing through the rails. In the joining of the rails end to end, to make a smooth surface, great care is bestowed; perfect steadiness in the required line of direction is secured by means of wooden wedges acting on the rails and the chairs.

Hitherto, the sleepers have been of seasoned native larch, as the most durable; but latterly, from the growing scarcity and cost of this article, sleepers have been made of imported timber from ports in the Baltic. They are sometimes *creosoted* to render them durable, but generally they are found to require renewal on account of splitting before they rot. Many patents have been taken out for methods of dispensing with wood sleepers, and substituting some more lasting material. Some of them are extensively used abroad, but they are scarcely to be found in this country.

Tunnels and Viaducts.—Tunnels are avoided as far as possible on account of their costliness. They are made only when the excavations would be more than 60 ft. in depth, or when land-proprietors force their adoption, in order to spare the amenity of grounds near a mansion. For this latter reason, some short tunnels are known to have cost railway companies as much as £50,000. Latterly, the execution of underground railways in the metropolis has offered examples of tunneling more extensive than were previously known in England, and at the same time popularized a method of subterranean transit almost as marvelous as anything in the way of viaducts. The Woodhead tunnel is probably the longest in Britain, being 3 m. 60 feet. All our tunnels have, however, been cast into the shade by that through the Alps near Mont Cenis. The highest summit of the section immediately over this tunnel is 9,527 ft., and the summit-level of the tunnel, 4,246 ft.—about the height of Ben Nevis—above the level of the sea. It was completed in 13 years, cost about £200 per linear yard, the total length being 7.6 m., and was opened Dec. 26, 1870. The time occupied in passing through the tunnel by train is 25 minutes. A still greater undertaking, the St. Gothard tunnel, was begun in 1872. Its length is 9.2 English m.; the cost by estimate is £2,000,000; and 8 years was the time specified for completing the work.

Viaducts are frequently of stone, and of handsome architecture, but now commonly of malleable iron girders, of various forms, set in stone or iron piers. In the construction of viaducts, there is a growing boldness of conception. Remarkable works of this kind are the great suspension East river bridge connecting New York and Brooklyn, more than a mile long, the central opening having a span of nearly 1600 ft.; and the St. Louis bridge, crossing the Mississippi by 3 arches, the center span being 520 feet. But the longest bridge in the world at present is that across the Firth of Tay, Dundee, opened May 31, 1878. It was designed by sir T. Bouch, and cost £350,000. Length, 16,612 ft., in 85 spans, 11 of them being 245 ft. each. A magnificent suspension railway viaduct crossing the Forth at Queensferry is now in progress. The contracts for its erection amount to £1,116,000.

Cost of Permanent Way.—Owing to the obstruction offered by land-owners, and their excessive claims for amenity damages, also the opposition of rival companies, the cost of railways was at one time very much greater than it is at present. The expenditure incurred in securing legislative authority to construct railways was likewise enormous. The parliamentary costs of the Brighton railway average £4,806 per m.; of the Manchester and Birmingham, £5,190 per m.; and of the Blackwall, £14,414 per mile! The cost of carrying the Liverpool and Manchester line was £27,000. It has been shown that the solicitor's bill for the South-eastern railway contained 10,000 folios, and amounted to £240,000. These few facts, however, afford but a feeble idea of the reckless wastefulness of capital on railway undertakings; it is universally allowed that, under a better policy, not only a much better railway-system might have been provided, but a saving effected of at least fifty millions. At the end of 1871, the total average cost of all the railways in the kingdom was £35,943 per m. open, or about double that of any other country.

The cost of construction varies so much, that it is impossible to say definitely what would be the average cost nowadays; but in England a double line, including station-houses, signals, and all other fixed plant, would probably cost, under ordinary circumstances, from £15,000 to £20 000 per mile. Single lines are made at perhaps a fourth less, but nowhere in the United Kingdom have they been executed so economically as in Scotland. There, some single lines have cost for land and everything not more than about £5,000 per m.—such economy, however, being greatly due to the fact, that the undertakings were promoted and watched over by bodies of land proprietors deeply interested in restraining expenditure. Of these cheap Scotch lines a good example is offered by the Peebles railway (practically a branch of the North British), extending to 18¾ m., the entire cost of which, and land station-houses included, was about £95,000. The cost of rolling stock was additional.

Maintenance of Way.—Every railway, great or small, is at a considerable expense in keeping the line in proper working order, for which purpose a staff of officials is required. Besides a general superintendent there is an effective staff of "plate-layers," whose duty it is to watch over and repair the permanent way.

ROLLING-STOCK.—Under this head are comprehended locomotives, carriages, and trucks for goods and minerals, the whole forming an important part of railway undertakings.

Locomotives.—Locomotives are of several kinds, varied in construction to suit the traffic for which they are designed. They may be classed as express, ordinary, passenger, goods, and tank engines. In the latter class the tender for fuel and water forms an extension of the locomotive; but for the most part the tender is detached, and only connected by couplings. Locomotives for ordinary traffic have generally six wheels. In the first two classes, where speed is the principal object, only two, or at most four of the six wheels are *driven*, and these are made of large diameter. There has been a continual tendency to increase the speed, and this has led to an increase in the size of the driving-wheels, which are in some cases 8 ft. in diameter. All the wheels of locomotives for heavy traffic are coupled together, so as to utilize the entire weight for adhesion. The smaller class of locomotives have only four wheels. The present price of first-class locomotives—of the largest size in general use—including the tender, varies from £3,000 to £4,000. Locomotives of this class weigh in trim from 30 to 40 tons: but there are, of course, much lighter locomotives; while sometimes they are as much as 55 or 56 tons.

Carriages.—There are three distinct kinds of carriages to suit the several classes of passengers. Each first-class carriage consists of three or four distinct compartments; but in the other classes the backs of the seats are in many cases not carried to the roof, leaving the upper part of the carriage open fore and aft. At night the carriages are lighted with lamps; on the metropolitan lines gas is sometimes used. Special saloon-carriages are reserved for royalty. The first-class compartments are handsomely fitted up, and in winter are heated by hot-water tins. Recently, one of the leading companies abolished its second-class carriages; and some companies now run third-class carriages with all trains. Passenger carriages made of iron have been used in America. Sleeping-carriages and the American Pullman cars have also been introduced into this country. Many efforts have been made to devise some simple and efficient contrivance by which passengers might, in cases of emergency, summon the guard, but no plan has as yet been adopted to any extent. The "continuous brake" is an improvement and novelty which has already been successfully tried, and is likely to be soon generally applied. By its use trains can be stopped in a much shorter time and distance than under the present system, and thus the risk of accident is reduced; brakes are fitted to each carriage, and all are simultaneously applied. The guard's van contains space for luggage, and is provided with a look-out box, from which the guard can see along the roofs of all the carriages in the train.

Wagons and Luggage Vans.—To accommodate its traffic, every railway must be provided with a large stock of trucks or wagons for carrying goods, minerals, cattle, timber, and other articles. Except for the heaviest traffic, wagons are now very generally fitted with elastic buffers.

TRAFFIC.—The traffic on railways is of two distinct kinds—passengers and goods; with the goods we include minerals, also timber and other bulky articles. The passenger and goods traffics are placed under separate managements. Usually, there are passenger-trains and goods-trains, but mixed trains are very common on branch lines.

In almost every railway in the United Kingdom, passengers are of three classes—first, second, and third. Though from the fares charged, first-class carriages possess an air of exclusiveness, no more objection is popularly taken to them than to the use of boxes in theaters; and, indeed, they are universally recognized as an advantage, for the reason that by the comparatively high fares exacted for them, the companies are enabled to lower the charges for second and third-class passengers. On some lines, compartments are set apart for ladies if they choose to use them. Special compartments of each class are now also allotted to smokers, a custom one may contrast with the special *non-smoking* carriages common on the continent. The first-class passengers have distinct waiting-rooms at the termini and stations, with generally a waiting-room in addition for ladies; for the second and third class, there is a waiting-room in common. The several waiting-rooms are neatly fitted up, and provided with suitable conveniences, including basins and water for washing the hands—accommodations which contrast favorably with what were furnished to travelers in the old coaching establishments. The waiting-rooms are open all day to the public, and there is seldom any restriction as to going on the platforms. Tickets are sold at a wicket not earlier than a quarter of an hour before the starting of the train. The tickets, marked in consecutive numbers, are stamped with the date on delivery, and excepting "return-tickets," will not answer for any other day. Return-tickets at a fare and a half are issued on most lines for the date of issue, or from Friday till Monday. On most lines first and second-class untransferable season tickets are issued for various periods at a considerable reduction on ordinary fares. To encourage the building of villas at a distance of 10 to 20 m. from termini, by which means a traffic may be developed, some companies give a personal ticket free for a number of years corresponding to the valued rental of the villa. The second-class has been abolished by the Midland railway.

The number of trains run daily depends on the pleasure of the directors. There are ordinary, mail, and express trains; of this last kind, two usually go each way daily, the fares on which are sometimes higher than by the others. Ordinary fares are about 2½d. per mile first class, 1¾d. second class, and 1d. to 1½d. third class; but on some lines the fares are considerably lower. According to one of the provisions of a general act, all companies must run one train daily each way, stopping at all stations, and at a rate of speed not less than 12 m. per hour, at a fare of a penny a mile. Some of the express trains are run at very high speeds, and with wonderful punctuality. On June 1, 1872, London was brought, for the first time, within 9½ hours of Edinburgh, by a train running on the East coast route, which, deducting stoppages, travels at an average speed of nearly 47 m. an hour. By an act, 5 and 6 Vict. cap. 79, there is payable to government "a duty at and after the rate of £5 per £100 upon all sums received or charged for the hire, fare, or conveyance of all passengers." By 7 and 8 Vict. cap. 85, it is enacted that no tax shall be levied on the receipts for passengers conveyed at fares not exceeding one penny per mile; but by the 26 and 27 Vict. cap. 33, it is enacted that this exemption shall only extend to trains running six days in the week, or on market-days for the conveyance of passengers at one penny per mile. From this passenger-tax Ireland is exempted.

All trains are accompanied by a "guard," who is responsible for their management while running. For the most part, guards are intelligent and obliging, and do all in their power to render service to the passengers. Nor must we omit to say that the porters on duty are remarkable for the trouble they take to carry luggage, find cabs at the termini, and to answer civilly such inquiries as may be put to them by strangers. It may be said with perfect justice, that in no department of affairs in Great Britain is there seen such readiness to oblige as in that connected with railways. Considering the vast number of servants on some lines—the total on all lines is probably about 300,000—the general good conduct that is shown, and the few accidents that occur, constitute a gratifying social phenomenon.

According to English routine, passengers are allowed to find their way promiscuously to the proper carriages, the only check being a call by the guard to "show tickets" previous to starting. All passengers are expected to see their luggage labeled for the place of destination, and to point out what belongs to them on arrival. This is a loose practice, often remonstrated against, but it suits the temperament and self-relying habits of the people. Amidst the crush of traffic, and with little time to spare, the formalities of the continental system would be unendurable. Should labeled packages, resigned to the porters and guard, be lost, recourse lies against the company. Another peculiarity of railway traveling in Great Britain consists in the privacy secured to passengers while on their journey. Instead of being intruded on, as in the American and continental railways, by the constant perambulation of the guard through the train, they are left unmolested to read, talk, or sleep, according as fancy may direct. This very seclusion, however, is thought to be attended with a disadvantage—namely, that passengers are unable to call for the assistance of the guard in cases of threatened outrage by one of their number. To all the numerous devices for summoning the guard, and, if need be, stopping the train, there is unfortunately the grave objection, that if passengers were enabled to call the guard at pleasure, they would frequently do so for no sufficient reason, as whim or imaginary fear prompted; and also, that the unexpected stoppage of trains would seriously derange the keeping of time, and in many lines jeopardize the safety of the whole of the passengers. Seemingly, it would be difficult to fall upon any plan free of this species of objection, unless recourse be had to the American construction of carriages, and the free perambulation of the guard through the trains—a remedy which involves a revolution in English railway transit, as well as in English feelings and manners.

To enable companies to reckon easily with each other as regards intercommunication of traffic in passengers, goods, use of carriages, etc., an institution called the clearing-house has been established in London, to which tickets are transmitted for cross-reckoning and settlement. There is a similar establishment in Dublin. See CLEARING-HOUSE.

Cost of Working.—The cost of working railways, including general expenditure, in Great Britain amounts to from 48 to 50 per cent of the returns from traffic. The remainder forms the divisible profit to pay—1st, the interest on debentures; and 2d, the dividend to shareholders. Of these shareholders, some, as defined by statute, have a preference claim of 5 per cent per annum, what is left over being divisible among the ordinary or original shareholders. In the general expenditure of railway companies is included the outlay for passenger-tax, also police, poor, and parish rates. Besides supporting the poor, the railways in Scotland are rated like heritors (q.v.) for building new parish churches.

According to a return made by railway companies to the board of trade for 1871, the cost of running trains was on an average of 30.33d. per mile, or say about £13 for 100 miles. Lowness of fares can only be secured by a large and well-sustained traffic; and the main reason why fares are much higher than they seemingly might be, is the frequent insufficiency of the number of passengers compared with the accommodation provided for them. A striking exemplification of the possibility of conveying large numbers at very low fares is afforded in the case of "excursion trains," in which sometimes 1000 individuals are taken 50 or more miles and brought back the same day for one or two shillings each.

STATISTICS.—A return issued by the board of trade to the house of commons gives the following statistics for the United Kingdom for the year 1876: Number of miles open, double lines, 9,169; single lines, 7,703—total, 16,872. Number of passengers (exclusive of holders of season and periodical tickets), first class, 44,859,066; second class, 66,478,195; third class, 426,950,034—total, 538,287,295. Minerals carried, 123,044,583 tons; general merchandise, 82,920,481. The traffic under all these heads has been more than doubled within 10 years. Miles traveled by passenger-trains, 105,918,921; by goods-trains, 106,139,827—total, 215,711,739; equal to near 9,000 times the circumference of the world; or 420 *double journeys* to the moon, and much more than a double journey to the sun. Receipts from passengers, £23,057,731. Receipts for excess luggage parcels, carriages, horses, dogs, etc., £2,418,057; receipts for carrying mails,

£684,533. Total receipts from passenger-trains, £26,163,551; an increase of fully 64 per cent in 10 years. Receipts for live stock, £1,230,948; for minerals, £13,520,213; general merchandise, £18,985,090—total of goods-traffic, £33,754,317; an increase of fully 93 per cent in 10 years. Total receipts from all services, £62,215,775. Working expenses including maintenance of way, locomotive power, repairs and renewals of carriages and wagons, etc., £33,535,509; net balance of receipts over working expenditure, £28,680,266. Proportion of expenditure to receipts, 54 per cent. Vehicles of all sorts employed, 464,527. The traffic receipts per m. of line open amounted to £3,551, and per m. traveled by train, to 5s. 6¾d.; in 1872, the figures were £3,244, 5s. 4½d., and in 1854, £2,510, 5s. 6½d. respectively. The receipts per train mile were highest in 1856, 5s. 11½d.; and lowest in 1870, 5s. 1½d.

The authorized capital by shares was £540,095,705; by loans, £192,706.822—total, £741,802,527. Total paid up on shares and debenture loans, £658,214,776. The proportion of paid-up capital to total length of line open was £39,012 per m., the highest proportion yet reached, having risen gradually from 1863, which was the lowest, viz., £32,804 per mile. Of the total capital, about 45 millions received no dividend at all; the highest dividend received was 13 per cent; but the greater part received from 4 to 5 per cent. For the first time since 1858, the returns for 1878 showed a falling off of 0.31 per cent in traffic. At the same date, the amount of authorized capital in shares and loans was £778,872,572; of paid-up capital, £698,545,154; the length of single and double lines, 17,333 m.; gross receipts, £60,454,375: per m. of line open, £3,488; per train mile, 5s. 5½d. The number of third-class passengers had increased 4 per cent; while there had been a decrease of first and second.

Accidents.—During the six months ending June 30, 1879, the number of railway accidents (collisions, running off lines, breaking of axles, etc.) in the United Kingdom was over 200—Passengers killed, 34; passengers injured, 442; number of servants of companies, trespassers, etc., killed, 370; injured, 955—total, killed, 404; injured, 1397. A large proportion of the accidents to passengers were due to causes within the control of the sufferers. The number reported killed in 1878 was 1053, and injured, 4,007; the list of casualties in 1876 was considerably larger, including 1245 killed and 4,724 injured.

Foreign Railways.—The first continental country that availed itself of railway locomotion was the small kingdom of Belgium, where a number of lines in connection with each other were constructed between 1834 and 1836, and in about ten years afterward the group was nearly completed in a well-devised and comprehensive scheme. From Belgium railways spread to France, where they were laid down on a plan prescribed by the government, which offered special encouragement to capitalists. The method adopted was to give the land and make the bridges; but, besides these heavy items of expenditure, the government was in a number of instances at the cost of the entire permanent way. So far favored, the promoters, who formed a company, had only to find capital to work and maintain the line. The government, however, relinquished the property only on the footing of a lease for such a number of years as a company was disposed to be satisfied with. Tenders were ordinarily taken from competing bodies of promoters; in this manner the concession, or right of tenancy, has been adjusted at from 50 to 99 years; at the end of the prescribed periods the lines will fall into the hands of the government. Latterly, the French system has outgrown this kind of tutelage; and there is a disposition in companies to act on an independent footing; the state, however, has secured a very general right of property in the existing lines, whether by the method of assistance originally fallen upon, or by giving large subventions of money, on the plan of receiving a share of profits after a certain dividend has been reached. By means of these subventions, as well as a species of guaranteed monopoly of traffic, the profits to shareholders in some French lines reach from 10 to 12 per cent. Within 99 years from 1852, a large proportion of the French railways will lapse into possession of the state. On one or other of the various plans of government helping companies, and preventing ruinous competition, nearly the whole railway system of continental Europe, Asia, and Africa is established; and in a large number of the foreign railway undertakings everywhere much British capital is invested. The principal continental railways, particularly in France and Belgium, are double lines, and under good management; but the rate of transit is generally slower than in England, and the formalities as to taking tickets and being allowed to enter the trains are exceedingly troublesome.

Various continental lines have been constructed by English contractors, who employed English navvies for the purpose. In Italy, however, as lately as 1862, we observed that the work of construction was performed in a tedious and laborious manner by women and girls, who carried the earth in baskets on their heads, under the superintendence of task-masters with whips—a sorrowful spectacle, and the more surprising as being in a country noted for its advancement in practical engineering.

In Canada, Nova Scotia, and Australia, railways have been successfully established; but in no British dependency has the railway system been latterly pushed forward with such activity or likelihood of advantage as in India, where, at the end of 1874, 6,273 m. were open for traffic; and at the beginning of 1878, 7,324 miles. The undertakings have been materially assisted by government, by giving the land to the companies, by subventions in proportion to the actual outlay, and in some instances by guaranties of a minimum dividend of 5 per cent to shareholders. Railways have likewise been introduced into China and Japan. A line from Shanghai to Woosung, in China, was opened in 1876 (unhappily closed again); and Japan, in 1878, possessed 66¼ m. of railway, with 142 m. in construction, and 455 m. sanctioned by government.

Railways in the United States date from 1830, when a short line was made in Massachusetts. All the American lines are constructed and worked by private companies, but in other respects they differ materially from similar undertakings in England. A few peculiarities of the American routine may be noted. The cost of procuring legislative authority to make the lines has usually been very small; the lines are mostly single, and the land for them has often been either given for nothing, or for a comparatively trifling consideration; the lines have generally no fences, and they go through populous towns along the open streets without restriction or fear of the consequences; the only care taken against accidents is for the driver to ring a bell, and it is usual to put up boards with the inscription: "Look out for the locomotive when the bell rings." Tickets are sold by the guard or at offices throughout a town without fixing a date, just as ordinary articles are sold at a shop; the waiting-rooms are generally of a poor description; as regards passengers, nearly all varieties travel in one class of carriage; and lastly, there is a marked deficiency of porters, station-keepers, and other officials, either to give information or render assistance to passengers. We may add that the trains proceed at a comparatively slow rate. The whole organization and management is, in fact, on a loose footing, though perhaps well adapted to the raw condition of a large part of the country. The seats in the "cars," as they are termed, are arranged in rows, with a passage up the middle for the conductor, who, by means of a small platform at each end, can step from carriage to carriage, and perambulate the train at pleasure, which he is constantly doing in the performance of his ticket-selling and ticket-taking duty. The wheels being attached to a swivel or *bogie* framework, the cars can turn round corners with ease, notwithstanding their great length. Altogether, the railway system of the United States can in no shape be brought into comparison with that of the United Kingdom, for the two things are constituted on very different principles. The chief desire in America has been to open up the country at all hazards to railway communication, leaving improvements to be effected afterward by the wealth which that communication is almost certain to create. On the contrary, in Great Britain and Ireland, there has been no pervading aim of this kind; every railway scheme has been legislated for and loaded with expenses as if it were a matter of indifference to the nation whether such projects should be carried out or not; and, as is well known, the comfort and convenience of passengers has, on the whole, at whatever cost, been a matter of primary concern to the companies.

The following particulars, which are almost entirely taken from the *Statesman's Year-Book*, may be found interesting. They show the mileage of railways open for traffic, and the proportion existing between that mileage and the area of the principal countries of the world:

STATES.	LENGTH OF RAILWAYS OPEN FOR TRAFFIC.		One mile of Railway to sq. miles of area in 1876.
	Dec. 31, 1855.	Dec. 31, 1876.	
	Eng. miles.	Eng. miles.	Eng. sq. miles.
EUROPE	21,140	92,116	41
Belgium	828	2,105	5
Great Britain	8,336	16,872	7
Switzerland	129	1,478	10
Germany	4,863	17,133	11
Denmark	18	853	12
France	3,436	12,723	13
Netherlands	195	1,223	17
Austria-Hungary	1,758	10,138	20
Italy	566	4,935	22
Spain	275	3,716	50
Sweden	23	2,336	54
Portugal	22	644	56
Roumania	...	766	59
Russia in Europe	649	12,350	148
Turkey in Europe	...	965	150
Norway	42	504	242
Greece	....	7	2,848
AMERICA	20,042	88,540	181
United States	19,247	77,457	46
Brazil	....	1,450	2,260
Peru	52	2,080	248
Dominion of Canada	....	6,412	599
AFRICA	....	1,847	850
ASIA	156	8,076	240
British India	156	6,938	129
AUSTRALASIA	....	2,688	2,050
Victoria	....	618	155
New Zealand	....	575	190
Tasmania	....	170	562
New South Wales	....	445	784

The total mileage open over the whole world is now probably about 200,000.

There are several newspapers devoted to railway subjects, issued weekly in London, the oldest of which is that known as *Herapath's Railway Journal.* We cannot close this notice without adverting to the important service rendered to the traveling community in the United Kingdom by *Bradshaw's Railway and Steam-Navigation Guide,* so well known to the public for its comprehensive and carefully constructed time-tables (q.v.). In France, Germany, the United States, and other countries, railway time-tables are now issued, weekly or monthly, on the plan so successfully established by Mr. Bradshaw, whose *Guide,* however, is not excelled for accuracy, cheapness, or the extent of its information.

RAILWAYS (*ante*). The first railroad in the United States was at Quincy, Mass., from the granite quarries to the Neponset river, and it was run by horse-power. As early as 1782, Oliver Evans of Philadelphia patented a steam-wagon. He built a high-pressure engine, placed it on wheels, and it transported itself a mile and a half. This was 20 years before Richard Trevethick had patented his steam-carriage, which was not practically applied on the Merthyr-Tydvil railway until 1804. But it was not until 1829 that a locomotive was actually running in America, and that one, which was exhibited in New York, was built by George Stephenson, the English engineer. The first American engine to be run in the United States was the "Tom Thumb," constructed by Peter Cooper, placed on the Baltimore and Ohio road in 1830. This was too small to be practically serviceable; but in the same year the locomotive "Best Friend" was built by manufacturers in New York from the plans of E. L. Miller, of Charleston, S. C., and was put on the road between that city and the town of Hamburg, being the first working locomotive built in America. The first actual and practical use of a locomotive on an American road was on a railroad built in 1828 by the Delaware and Hudson canal company from their mines to Honesdale, the terminus of the canal, and where a locomotive imported from England, and built at Stourbridge, was running in the summer of 1829. The Baltimore and Ohio railroad was commenced in 1828, and in 1831 carried more than 80,000 passengers and about 6,000 tons of freight. In Aug., 1830, the Mohawk and Hudson railroad, from Albany, N.Y., to Schenectady, was commenced; whose charter, dating 1826, was perhaps the earliest given. It was the first railroad in New York, and began to operate Sept., 1831. The title of this road was afterward changed to the Albany and Schenectady. In 1830 the Baltimore and Susquehanna railroad was commenced; and in the same year, the Baltimore and Ohio, which had been chartered in 1827, was opened between Baltimore and Ellicott's mills. In 1831 a road was built from Manchester, Va., 13 m. up the James river to the coal mines; and in this year there was also constructed a little road, 4½ m. long, connecting lake Pontchartrain with New Orleans. The Boston and Lowell railroad was among the earliest in this country. In 1832 there were 67 railroads in operation in Pennsylvania, and most of the important lines in Massachusetts and New Jersey were commenced in that year. The New York and Erie railroad was commenced in 1836, and completed in 1851 as far as Dunkirk. At the close of the year 1838 there were 1843 m. of railroad in the United States. All the early roads were built on the English gauge of 4 ft. 8½ inches. They were constructed by laying wooden or stone cross-ties, to which were pinned longitudinal wooden rails, and upon these rails were fastened with spikes flat bars of iron, ½ and ⅝ of an in. thick, and 2½ to 4½ in. wide, the heads of the spikes being counter-sunk in the iron. This method proved dangerous, because the ends of the rails were liable to start, breaking sometimes through the bottom of a car. The building of the New York and Erie railroad may be considered the origin of practical competition between railroads and between cities. Its construction was hastened with a view to divert to New York the traffic which had before gone to Boston from the west, via Albany. The Boston and Albany had completed its through organization by way of the Western railroad (Mass.) and the Albany and West Stockbridge in 1842. In 1848 the railroad mileage of the United States was 6,491; in 1858 it was 27,158. The New York, New Haven and Hartford railroad was formed by the consolidation in 1872 of the New York and New Haven railroad, opened in 1846, and the Hartford and New Haven, opened in 1839. The Pennsylvania railroad was completed in 1854. The Central of New Jersey was formed by a consolidation in 1849, and completed to Jersey City in 1864. The New York Central and Hudson River railroad was formed by a consolidation in 1869 of the N. Y. Central (itself a consolidation in 1853) and the Hudson River railroad. To show, by one method, the progress of certain of the more important roads in the United States from 1869 to 1879, inclusive, the following figures are suggestive. In 1869 the total mileage controlled by the Pennsylvania railroad company was 538; in 1879 it was 4,000. That of the New York Central and Hudson River road was 593 in 1869, and 2,500 in 1879. The Chicago and Northwestern, 1150 in 1869, and 2,158 in 1879. The Chicago, Milwaukee and St. Paul, 830 in 1869; 2,250 in 1879. The mileage operated in 1879 of the principal railroads other than the above was as follows: New York, Lake Erie and Western, 1000 m.; Baltimore and Ohio, 1500; Chicago and Alton, 677; Chicago, Burlington and Quincy, 1709; Chicago, Rock Island and Pacific, 1003; Illinois Central, 1255; Wabash, 678; Michigan Central, 803; Lake Shore and Michigan Southern, 1176; Atchison, Topeka and Santa Fe, 868; St. Louis, Iron Mountain and Southern, 684; Delaware, Lackawanna and Western, 670; Philadelphia and Reading, 799; Atlantic and Great

Western, 512; Central Pacific, 1213; Union Pacific, 1042; Southern Pacific, 1150; Kansas Pacific, 672; Northern Pacific, 646. The 10 years 1869–79 were the most important period in American railroad history, especially in connection with the construction of transcontinental roads, and the opening of the far west and the Pacific coast to settlement and traffic. The completion of the Union and Central Pacific railroads at the beginning of the decade was followed by a stupendous movement which, by 1879, comprehended the following situation:

ROUTES AND CONDITION OF THE VARIOUS PACIFIC RAILROADS IN 1879.

NAME.	ROUTE.	CONDITION.
1. Canadian Pacific.	From a point w. of Ottawa, via the n. coast of Lakes Superior and Winnipeg, crossing the Rocky mountains at Yellowhead pass, and ending at Buzzard inlet, about lat. 49°.	Several hundred m. under construction, from lake Superior west. The line to be 1750 m. long, and to be completed in 5 years.
2. Northern Pacific.	From Duluth and St. Paul, Minn., w., between the 46th and 48th parallels to Puget sound, a distance of about 1800 miles.	Over 800 m. constructed, and will probably be completed in 3 years.
3. Union and Central Pacific.	From Omaha to San Francisco, 1916 m., starting about lat. 42°, and ending lat. 38°.	Pioneer line, completed 1869.
4. Utah and Northern.	Branch of the Union Pacific (3 ft. gauge), starts from Ogden and runs into Montana. It is designed to extend this road northwesterly to the Columbia river, and compete with the Northern Pacific.	Constructed 210 m. n. from Ogden to Eagle Rock, Idaho.
5. Thirty-fifth parallel route.	This is the St. Louis and San Francisco company from St. Louis to Vinita, Ind. terr., and from Pierce City, Mo., to Wichita, Kan., where it connects with the Atchison, Topeka and Santa Fe, now nearly completed to the Rio Grande at Santa Domingo. At the 35th parallel these companies become owners of the franchises of the Atlantic and Pacific company, and agree to build to the Pacific. The line will have two termini, San Diego and San Francisco.	Constructed 327 m. to Vinita, Ind. terr., 900 m from Kansas City to the Rio Grande. To be completed in 2 years.
6. Southern Pacific, or 32d parallel.	From San Francisco into Arizona, and to El Paso, New Mexico. Here it will join the Galveston, Harrisburgh and San Antonio, completing a line to Texas and the gulf coast, and uniting with the Texas and Pacific road. The latter will extend e. to Vicksburg, and will unite with the St. Louis, Iron Mountain and Southern for the n. and east.	Open from San Francisco 900 m., into Arizona. Texas Pacific open 253 m. from Texarkana to Fort Worth, besides branches.

The last report of the Atchison, Topeka and Santa Fe, for the year 1880, shows gross earnings, $8,556,975; operating expenses and taxes, $4,303.205; leaving—subtracting dividends and other expenses, $3.272,054—a net surplus of $941,716. The Atlantic and Pacific has been pushed 100 m. w. from Albuquerque, and during the year 1881 will reach the northern counties of Arizona. The country lying on both banks of the Red River of the North, comprises a fertile belt, 300 m. wide, of rich prairie land, embracing an area of 200,000,000 acres, and promising to become the unrivaled wheat district of the world. This country has been opened by various lines of railroad, now consolidated in the St. Paul (Minn.), Minneapolis and Manitoba railway, and the Northern Pacific. The latter line was chartered in 1864, to construct a railroad and telegraph from lake Superior to Puget sound, a distance of 1800 m., with a branch to Portland, Oregon, about 200 miles. The aggregate grants of land to this road amount to 47,000,000 acres. The failure of Jay Cooke & Co., in 1872, precipitated the great financial panic of that year, and was itself caused by the impracticability at that time of the firm's sustaining the vast financial weight involved in the construction of the Northern Pacific railroad. Notwithstanding this disaster, the road has advanced under new management, and already its line is dotted by settlements containing 65,000 busy inhabitants, with the usual American surroundings of houses, schools, and churches. A quarter of a million acres of land are under cultivation, the sales of land being nearly sufficient to defray the cost of building the road, as this accrues. In June, 1879, the line was in operation from Duluth, on lake Superior, to Bismarck, Dakota, 449 m., with a branch in Washington territory from Kalama, on the Columbia river, to Tacoma, on Puget sound, a distance of 136 m., making a total length of road of 583 miles. A n. and s. connection is secured by a 99 years' lease of the line from Brainerd, down the Mississippi, to St. Paul, 136 miles. As connection with Manitoba and the Canada north-west is also opened by the Duluth and Winnipeg route, length 340 m., it will be seen that the vast wheat belt of the north will become united via St. Paul, to the great trunk-line railroad system of the central and eastern portions of the United States. Meanwhile, the entire congeries of roads will connect the three Pacific coast termini—Puget sound, San Francisco, and San Diego; New Orleans and the gulf of Mexico being reached by the Mississippi river, and by n. and s. lines of railroad in progress.

Though the southern states had advanced less rapidly in the construction of railroads up to 1879 than the north and west, they were fairly supplied. In that year there were in Maryland 29 railroads; West Virginia, 11; Virginia, 24; Kentucky, 27; North Carolina, 22; Tennessee, 23; South Carolina, 16; Georgia, 28; Florida, 8; Alabama, 24; Mississippi, 16; Louisiana, 11—in all, 239 distinct lines. In 1879 and 1880 important combinations and consolidations of southern roads were effected, and new roads projected and constructed; the whole tendency being toward the establishment of independent trunk lines from the n.w. to the s. Atlantic seaboard, with a view to lessen the vast preponderance of railroad vitality and influence in the north over the south. The Nashville and Chattanooga, Louisville and Nashville, Central of Georgia, Cincinnati Southern, and other southern roads thus assumed a marked prominence—not alone in the stock-market, but also as newly effective links in the great chain of railroad transportation of the United States. The Cincinnati Southern railway is perhaps the only existing instance of a city building a railway for its own purposes. The city of Cincinnati, Ohio, built this line under the direction of a board of trustees created by an act of the legislature of Ohio, May 4, 1869, construction being begun Dec., 1873. The road is 336 m. in length from Cincinnati to Chattanooga, Tenn.: crosses four navigable rivers—the Ohio, Kentucky, Cumberland, and Tennessee—and includes 27 tunnels and 4 bridges (of which 3 are iron), and has steel rails. By connection with the Alabama Great Southern at Chattanooga, it reaches Vicksburg, New Orleans, and Mobile; and by a branch line (building) to Carrollton, Ga., reaches Atlanta, Ga., whence, by the Central Georgia railway system it can make connection with the Atlantic seaboard at Savannah or Port Royal.

The dominion of Canada is brought into direct relation with the United States system, by the Intercolonial, Great Western, and Grand Trunk railways. The stupendous enterprise and energy which, in the course of half a century, have spanned and intersected the North American continent with railway lines covering twenty degrees of latitude and sixty of longitude, are evident even in this outline. That, so far as the United States are considered, the present position of its railroads has not been reached without embarrassments, may be seen in the following table of the number of roads sold under foreclosure during the four years ending in 1879:

YEARS.	No. of roads.	Mileage.	Capital invested.
1876	30	3,846	$217,848,000
1877	54	3,875	197,984,000
1878	48	3,902	311,631,000
1879	65	4,909	243,288,000
	197	16,532	$970,751,000

In four years one-fifth of the entire railway mileage and capital of the United States was compelled by forced sale to change ownership.

At the close of the year 1879 there were in the United States 85,580 m. of railroad, employing 16,445 locomotive engines, 11,683 passenger cars, 423,013 freight cars. The capital stock of these roads amounted to $2,292,257,877; their funded debt to $2,297,790,916; and their total capital account to $4,772,297,349. The cost of these railroads and their equipments was $4,166,331,921. Their gross earnings amounted to $529,012,999. In the twelve years between 1866 and 1878 the mileage of American railroads more than doubled. In the latter year the mileage by groups of states was as follows:

New England states	5,873
Middle states	15,454
Southern states	14,026
Western states	43,190
Pacific states	3,298

It will thus be seen that the western states had a mileage nearly one-third greater than that of all the other states put together—quite one-third, adding those in the Pacific states. The following table shows the relation of the railroads to the area of the different states in 1878:

STATE.	Area sq.m.	Miles of Railroad.	STATE.	Area sq.m.	Miles of Railroad.
Maine	35,000	988	Ohio	39,964	5,151
New Hampshire	9,280	1,209	Michigan	56,451	3,593
Vermont	10,212	873	Indiana	33,809	4,198
Massachusetts	7,800	1,872	Illinois	55,410	7,505
Rhode Island	1,506	208	Wisconsin	53,924	2,809
Connecticut	4,750	922	Minnesota	83,531	2,534
New York	47,000	5,839	Dakota	150,932	320
New Jersey	8,320	1,663	Iowa	55,645	4,265
Pennsylvania	46,000	6,010	Missouri	65,350	3,286
Delaware	2,120	279	Arkansas	52,198	783
Maryland	11,124	951	Texas	274,356	2,438
West Virginia	23,000	668	Nebraska	75,995	1,344
Virginia	38,348	1,645	Kansas	81,318	2,427
Kentucky	37,630	1,528	Colorado	104,500	1,164
North Carolina	50,704	1,448	California	188,981	2,148
Tennessee	45,000	1,665	Utah	84,476	543
South Carolina	34,000	1,418	New Mexico	121,201	8
Georgia	58,000	2,414	Nevada	124,125	627
Florida	59,248	486	Arizona	113,916	27
Alabama	50,722	1,880	Oregon	94,274	282
Mississippi	47,156	1,126	Washington Territory	69,994	212
Louisiana	41,346	466			

In 2,648,416 sq.m. of area there are 85,580 m. of railroad. Some comparison of this relation in foreign countries may be made.

COUNTRY.	Area sq.m.	Miles of Railroad.
Great Britain	111,000	16,082
France	204,000	11,000
Germany	210,000	13,500
Belgium	11,000	2,500

The United States have 1 m. of railway to every 32 sq.m. of area; Great Britain, 1 to every 7 of area; France, 1 to every 18; and Belgium, 1 to every 4.40 sq.miles. The proportion of railroad mileage to area as regards the different sections of the United States is as follows:

SECTION.	Area sq.m.	Miles of Railroad.
New England States	71,348	6,072
Middle States	103,440	13,791
Southern States	496,278	15,645
Western States	950,000	45,604

The New England states have 1 m. of railroad to 11¾ sq.m. of area; the middle states 1 to 7¼ of area; the western states 1 to 23; and the southern states 1 to 23. The increase in mileage in 1879 was greater than in any year since 1873, the following table showing the record of the year as to this point:

STATES.	Miles broad gauge.	Miles narrow gauge.	Total.	STATES.	Miles broad gauge.	Miles narrow gauge.	Total.
Arizona	153	....	153	Nevada	....	35	35
Arkansas	....	9	9	New Jersey	4	....	4
Colorado	7	60	67	New Mexico	125	....	125
Dakota	220	....	220	North Carolina	25	....	25
Georgia	10	25	35	New York	67½	6	73½
Illinois	90	....	90	New Hampshire	....	9½	9½
Indiana	74	40½	114½	Ohio	105	108½	213½
Iowa	325	46	371	Oregon	30	....	30
Idaho	....	90	90	Pennsylvania	14	5	19
Kansas	498	....	498	South Carolina	....	2	2
Kentucky	65	....	65	Tennessee	119	57	176
Louisiana	65	....	65	Texas	120	67½	187½
Maine	....	18	18	Utah	83	46	129
Maryland	18	....	18	Virginia	29½	....	29½
Massachusetts	11	....	11	West Virginia	....	20	20
Michigan	12	41½	53½	Wisconsin	60	15	75
Minnesota	394	....	394				
Missouri	161	27	188	Total	3,010	728½	3,738½
Nebraska	125	....	125				

The following table shows the number of miles of railroad in each group of states, Dec. 31, 1867–79, reported for Poor's *Manual:*

GROUPS OF STATES.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
New England States...	3,938	4,019	4,293	4,494	4,898	5,053	5,314	5,509	5,638	5,683	5,814	5,873	5,908
Middle States..........	9,555	9,765	10,425	10,964	12,030	12,954	13,643	14,050	14,455	14,754	15,142	15,454	15,679
Southern States........	9,549	10,068	10,362	11,163	12,018	12,538	12,977	13,237	13,287	13,631	13,812	14,019	14,333
Western States.........	15,777	17,488	20,600	24,587	29,562	33,677	36,179	37,300	38,254	39,836	41,169	43,132	46,963
Pacific States..........	431	889	1,164	1,677	1,790	1,949	2,165	2,287	2,462	2,904	3,152	3,298	3,619
Grand total......	39,250	42,229	46,844	52,914	60,293	66,171	70,278	72,383	74,096	76,808	79,089	81,776	86,497

TABLE SHOWING AMOUNT OF FREIGHT MOVED, EARNINGS FROM FREIGHT, AND RATE OF CHARGE PER TON PER MILE ON THE RAILROADS NAMED, IN 1873 AND 1879.

LINE OF ROAD.	Tons of freight moved.		Receipts from freight.		Rate per ton per mile, cents.		Miles of Railroad.	
	1873.	1879.	1873.	1879.	1873.	1879.	1873.	1879.
Boston & Albany..........	2,884,520	2,738,096	$6,221,184	$3,588,839	1.96	1.10	293	322
N.Y. Cent. & Hudson River	5,512,124	9,015,753	19,616,018	18,270,250	1.57	0.81	858	1,018
N.Y., Lake Erie & Western	6,312,702	8,212,641	15,015,808	12,233,481	1.45	0.78	950	928
Pennsylvania..............	9,211,234	13,684,041	19,608,555	17,017,089	1.41	0.79	869	1,092
Pittsburg, Fort Wayne & Chicago..................	2,316,568	3,679,382	6,716,899	6,066,598	1.41	0.76	468	468
Lake Shore & Mich.S'uth'n	5,176,661	7,541,294	14,192,899	11,288,261	1.83	0.64	1,154	1,177
Michigan Central..........	2,186,786	3,513,819	4,918,962	4,986,988	1.22	0.69	801	804
Chicago & Alton..........	1,642,443	2,684,177	3,897,462	4,242,791	2.12	1.05	649	787
Chicago, Burlington & Quincy	2,221,744	4,686,520	8,035,349	11,650,623	1.92	1.02	1,236	1,783
Chicago, Milwaukee & St. Paul....................	1,791,504	2,559,734	6,421,369	6,850,755	2.49	1.72	1,399	1,996
Chicago and Northwestern	2,958,390	4,265,937	8,614,260	9,924,090	2.85	1.56	1,382	1,616
Chicago, Rock Island & Pacific..................	1,286,966	2,236,670	4,597,982	6,029,926	2.29	1.43	674	1,125
Illinois Central............	2,057,360	2,324,485	4,148,901	3,262,526	1.51	0.97	705	705
Totals..............	45,557,002	67,092,549	$112,004,648	$116,311,452	av. 1.77	av. 1.02	11,438	13,821

A fair average car-load is estimated at 26,000 lbs. On this basis the ordinary railroad freight car will hold: corn, 450 bush.; barley, 400 bush.; oats, 800 bush.; rye, 400 bush.; wheat, 425 bush.; bran, 1,000 bush.; flaxseed, 360 bush.; apples, 360 bush.; potatoes, 480 bush.; whisky, 60 bbls.; salt, 70 bbls.; lime, 70 bbls.; flour, 90 bbls.; flour, 200 sacks; cattle, 18 head; hogs, 50 head; sheep, 80 head; hard wood, 6 cords; solid board, 6,000 ft.; shingles, 40,000 ft.; hard lumber, 20,000 ft.; green lumber, 15,000 ft.; joist, scantling, and large lumber, 4,000 feet. Much discussion has arisen with regard to the proper unit of value for freight charges, one plan, that of making the car-load the unit, having the largest number of advocates in congress, state legislatures, and the American newspaper press. It is claimed by the opponents of this plan, that the car-load is eminently a variable quantity, and therefore not suited for a unit of value. The entire question of railroad management has been of late years constantly before congress and the legislatures of the different states (notably New York), and numerous investigating committees have considered the subject in all its bearings. Frequent complaints of discriminations and rebates in freight-rates in the case of favored individuals have aroused popular feeling in regard to the general management of freight transportation, and much crude opinion is exploited on the subject. It is a fact, that in the face of the enormous increase in transportation and demand for railroad conveniences, the charges for freight have steadily decreased during the decade ending in 1880. The free competition possible in America in building and running railroads, and the extraordinary liberality of the national government in land-grants and of state legislatures in franchises, combined with the certain though slow working of natural economic laws, are gradually solving many of the most complicated railroad problems to the practical satisfaction of all concerned. In Massachusetts and some other states, railroad commissioners appointed by the legislatures, have been given authority and jurisdiction in railroad affairs. The best political economists are still in doubt as to the advisability of such interference with railroad management as a business. Mr. Charles Francis Adams, who is an authority on the railroad question, is in favor of the federation of railroads, and is also of the opinion that eventually the American railway system will come under the control of the national government. In regard to this whole matter, Mr. Edward Atkinson, also a recognized authority, has recently offered the following valuable assurance: "There is much contention in this country in regard to the railroad corporation as a factor in our own politics, and much complaint is made in respect to alleged monopolies; but it will be observed that the great lines against which this charge is made—to wit, the systems consolidated and designated as the New York Central, the Erie, the Pennsylvania, and the Baltimore and Ohio—may also be named and designated as comprising the specific miles of railroad on which the largest service is done for the community at the least relative cost. It would matter not if all these lines were consoli-

PACIFIC RAILROADS. 'TABLE OF LAND GRANTS, MILEAGE, COST, ETC.

ITEMS.	Northern Pacific.	Union-Central routes.	Atlantic and Pacific.	Southern Pacific.	Texas Pacific.	Total.
Acres land granted of all received	57,920,000	41,458,924	51,840,000	11,967,488	18,000,000	181,186,412
Acres estimated to be obtained..............	42,500,000	32,200,813	17,008,150	10,445,000	12,000,000	114,153,963
Acres earned by construction and vested....	15,000,000	30,419,181	1,140,000	5,687,176	none.	52,246,357
Acres patented to companies................	746,500	8,388,155	504,536	1,048,090	none.	10,687,290
Acres sold by companies.....................	2,600,000	5,469,004	215,000	279,623	none.	8,563,627
Amount realized from sales................ ..	$9,000,000	$25,742,789	$623,750	$1,017,256	none.	$36,383,795
Average price per acre......................	$3.46	$4.70	$2.90	$3.64	none.	$4.25
Acres vested unsold.........................	12,400,000	24,950,177	925,000	5,407,553	none.	$43,682,730
Estimated value.............................	$31,000,000	$39,290,499	$1,850,000	$6,739,441	none.	$78,889,940
Acres invested by reason of non-construction	27,500,000	1,781,632	15,868,150	4,757,824	12,000,000	$61,907,606
Estimated value..........	$68,750,000	$4,454,080	$31,736,300	$5,947,280	$24,000,000	$134,887,660
Miles subsidized with lands.................	2,450	3,187.82	2,500	929	1,061	10,128
Miles constructed or owned..................	680	3,414.92	175	nsubs.132 (578)	840	5,687
Cost of same................................	$24,853,416	$318,852,888	$30,691,974	$64,767,043	$27,418,108	$465,584,029
Cost per mile of same.............	$35,818	$93,224	$30,768	$91,062	$61,171	362,058
Miles to be constructed.....................	1,865	139.19	2,325	350	840	5,519
Estimated cost of same......................	$50,110,000	$5,600,000	$58,125,000	$10,500,000	$43,700,000	$168,035,000
Cost per mile of same.......................	$26,868	$40,000	$25,000	$30,000	$30,000	$151,868
Total miles of route or system..............	2,700	3,554	2,500	929	1,901	11,584
Total cost of same..........................	$75,000,000	$323,952,888	$88,816,974	$75,267,643	$147,525,000	$710,562,505
Total cost per mile of same.................	$28,000	$91,151	$35,525	$81,020	$37,416	$273,112
Estimated present cost......................	$75,000,000	$91,069,300	$50,000,000	$23,225,000	$71,128,108	$310,442,408
Estimated cost of same per mile.............	$28,000	$28,624	$20,000	$25,000	$20,000	$121,624

dated, even under one man's guidance. The same rule would control him that now controls them all, and compels a constant abatement in the charge, constant improvement in method, and constant reduction in cost of operation. The rule is, that it is not the competition of rail with rail that controls or limits the charge, that may be made for their use, but the competition of product with product in the great markets of the country and of the world. No man, and no combination of men, can permanently prevent this competition working its just and beneficent results in the wider distribution of the elements of subsistence, in the abundant consumption of which material prosperity consists." (*The Railroads of the United States*, by Edward Atkinson. Boston, 1880: p. 30.)

RAILWAYS, ELEVATED. The plan of constructing a railway on the principle adopted by these roads was first undertaken in New York by the West Side (patented) Elevated railroad company, which was chartered in 1871, and sold out under foreclosure in the same year, being purchased by the New York Elevated railroad company, organized Jan. 3, 1872. The latter completed its road to its present termini in 1878; the lines extending from South ferry to Harlem river on the e. side of the city, 10.20 m., and on the w. side to 83d st., 6.27 m.; with branches at 42d st., 34th st., and city hall, 1 03 m.; in all, 17.50 miles. At the close of the year 1879 the rolling-stock of this line included 131 locomotive engines, 292 passenger cars, 8 service cars. The capital stock as originally authorized was $10,000,000, of which $6,500,000 was issued; the total stock and bonds of the road, representing its nominal cost, amounting to $15,000,000. The road and property were leased May 20, 1879, to the Manhattan railway company, which commenced operating the road Sept. 1, 1879, guaranteeing the payment of interest on its bonds, and 10 per cent dividends on the capital stock, dividends payable in quarterly installments. Following is a table showing—

ABSTRACT OF OPERATIONS AND FINANCIAL CONDITION.

YEARS.	Miles R.R.	Engines.	Cars.	Passengers carried.	Gross earnings.	Net earnings.	Interest paid.	Capital stock.	Funded debt.	Cost of construction.
1871-72......	3.5	2	5	187,446	$13,745	$501	......	$350,000	......	$54,000
1872-73......	4.0	4	8	644,026	64,603	2,845	......	754,200	......	1,500,000
1873-74......	4.0	5	10	796,073	81,047	560	......	798,300	......	1,500,000
1874-75......	4.0	8	16	920,571	98,631	5,259	......	798,300	$771,000	1,456,807
1875-76......	5.0	14	25	2,012,954	202.675	14,498	......	806,125	771,000	1,685,719
1876-77......	5.7	20	39	3,011,863	303,209	111,544	$99,996	1,063,125	1,740,000	2,843,588
1877-78......	14.85	61	114	4,916.322	429,988	179,261	150,972	3,190,125	4,809,000	3,498,170
1878-79......	17.50	131	292	29,875,912	2,239,489	1,068,149	477,715	6,500,000	8,500,000	......

The second elevated railroad was organized as the Gilbert Elevated railroad company in 1872, and adopted the name Metropolitan Elevated railroad company in 1878. Its gauge is 4 ft. 8½ in.; rail all steel, 56 and 63 lbs. The road was opened June 4, 1878. In 1879 its rolling-stock comprised 56 locomotive engines, 180 passenger cars, 2 freight cars. May 20, 1879, the road was leased to the Manhattan railway company, whose capital stock was fixed at $13,000,000; and whose total capital and funded debt, by its composition out of the two above companies, and under its organization, became $30,000,000. The lines of this road extend from Kingsbridge via River st., 8th av., 110th st., 9th av. and 53d st., to 6th av.; also from 59th st. and 6th av., via 6th av., Amity st., South 5th av., W. Broadway to College place, Murray st., Church st., Beaver st., Pearl st. to Division st.; also from Division st., via Allen st., 1st av.; 23d st., 2d av., River st., to 8th av. and River st. The length of the road laid at the end of 1879 was 25.9 m.; the number of passengers carried in the year was 16,069,489; the number of accidents, 8 killed, 9 injured. The total earnings amounted to $1,285,980.09; transportation expenses, $709,524,47. The first of these roads was laid on the 9th av.; and, though freely patronized by those in its immediate vicinity, did not serve to popularize the idea of a railroad which is actually an enormously elongated iron bridge of slight appearing frame-work, and certainly liable to all the casualties and contingencies peculiar to iron bridges. The Metropolitan Elevated railroad through 6th av., while at once gaining an enormous patronage, roused much indignation on the part of storekeepers and property owners and holders along its route on account of its noise, complaints of dropping oil, dangers real and imaginary, etc. Gradually the objections were silenced as citizens became more accustomed to the existence of the roads, and now they are recognized as indispensable. By giving rapid transit to the northern wards of the city, they have made cheap rents with comfortable and healthy residences possible to the laboring man; while they afford to those in better circumstances a rapid and luxurious mode of passing between their homes and their places of business. The plan is being introduced in Brooklyn, and will doubtless be adopted by other cities.

RAIMONDI, Marc Antonio, a celebrated engraver, was b. at Bologna in 1487 or 1488. He studied for several years under the celebrated painter Francia, the head of the old Bolognese school. On quitting Francia's studio, he went to Venice, and having seen there, for the first time, prints from the wood-cuts after Albert Dürer, he engraved on copper two sets of prints from that great master's designs, viz., those illustrating the "Life of the Virgin," and of the "Life and Passion of Christ;" to that of the former he attached the cipher or monogram of Albert Dürer, and it is said that the artist complained of the deception to the senate, but only obtained an order that in future the monogram of Albert Dürer should not be copied; at all events, the latter set is without the monogram or mark. From Venice Raimondi proceeded to Rome, soon attracted the notice of Raphael, and engraved those works after that master that are so highly valued. Raimondi greatly improved his style by imitating the remarkable delicacy and clearness exhibited in the engravings of Albert Dürer and Lucas van Leyden; and though, perhaps, in these qualities he did not surpass, or perhaps equal, these masters, he went far beyond them in power and purity of drawing, which he carried further than any other engraver; indeed, it has been stated that Raphael himself assisted the engraver in drawing on several of the plates.

After Raphael's death, having engraved some plates after drawings of a licentious kind by Giulio Romano, he was thrown into prison by Clement VII., but was afterward liberated, taken under the protection of the pope, and fully employed. This prosperous state of matters, however, soon terminated, for on the sack of Rome by the Spaniards under the Constable Bourbon, in 1527, he was plundered of all he had, and was obliged to flee and take refuge in Bologna, where he seems to have lived till the period of his death, the exact date of which is not known, but it must have been after 1539, for a print by him, after Giulio Romano, of the "Battle of the Lapithæ," bears that date.

Good impressions of this eminent engraver's works bear, perhaps, a higher value than any other engravings; but there are numerous impressions from his plates to be met with which are of little value, having been thrown off after they had been greatly worn, and repeatedly retouched. The best impressions are without the name of any publisher. After the plates were taken from the stock of Tommaso Barlacchi, they came into the possession of Antonio Salamanca; afterward, they passed through the hands of Antonio Lafreri, from thence to Nicholas van Aelst, and lastly, became the property of Rossi or De Rubeis, and by that time they had been completely worn out.—See catalogue of Raimondi's engravings by baron Heineken, and Bartsch, vol. xiv. Very fine collections are to be seen in the British museum and the Louvre.

RAIN. At a given temperature air is capable of containing no more than a certain quantity of aqueous vapor invisibly dissolved through it, and when this amount is present, it is said to be saturated. Air may at any time be brought to a state of saturation by reducing its temperature; and if it be cooled below this point, the whole of the vapor can now no longer be held in suspension; but a part of it, passing from the gaseous to the liquid state, will be deposited in dew, or float about in the form of clouds. If the temperature continues to fall, the vesicles of vapor that compose the cloud will increase in number, and begin to descend by their own weight. The largest of these falling fastest, will unite with the smaller ones they encounter in their descent, and thus drops of rain will be formed whose size will depend on the thickness and density of the cloud. The point to which the temperature of the air must be reduced in order to cause a portion of its vapor to form cloud or dew, is called the dew-point.

Hence, the law of aqueous precipitation may be stated: Whatever lowers the temperature of the air at any place below the dew-point, is a cause of rain. Various causes may conspire to effect this object, but it is chiefly brought about by the ascent of the air into the higher regions of the atmosphere, by which, being subjected to less pressure, it expands, and in doing so, its temperature falls. Ascending currents are caused by the heating of the earth's surface, for then the superincumbent air is also heated and consequently ascends by its levity. Air-currents are forced up into the higher parts of the atmosphere by colder, drier, and therefore heavier wind-currents getting beneath them, and thus wedgeways thrusting them upward; and the same result is accomplished by ranges of mountains opposing their masses to the onward horizontal course of the winds, so that the air, being forced up their slopes, is cooled, and its vapor liberated in showers of rain or snow. Again, the temperature of the air is lowered, and the amount of the rainfall increased, by those winds which convey the air to higher latitudes. This occurs chiefly in temperate regions, or in those tracts traversed by the *return trade-winds*, which in the north temperate blow from the s.w., and in the south temperate zone, from the north-west. The meeting and mixing of winds of different temperatures is also known to produce rain, but not nearly to the extent at one time believed. It is also increased or diminished according as the prevailing winds arrive immediately from the sea, and are therefore moist, or have previously passed over large tracts of lands, and particularly mountain ranges, and are therefore dry. Since the rain-fall is evidently much modified by the temperature of the earth's surface over which the rain-producing winds blow, it follows that sandy deserts, by allowing solar and nocturnal radiation to take immediate effect in raising or depressing the temperature, and forests, by delaying, if not, in many cases, counteracting these effects of radiation, have each a peculiar influence on the rain-fall.

Rain is the most capricious of all the meteorological phenomena, both as regards its frequency and the amount which falls in a given time. It rarely or never falls in certain places, which are, on this account, designated the rainless regions of the globe—the coast of Peru, in South America; the great valley of the rivers Columbia and Colorado, in North America; Sahara, in Africa; and the desert of Gobi, in Asia, are examples; whilst, on the other hand, in such regions as Patagonia, it rains almost every day. Again, the quantities which have been recorded at some places to have fallen at one time, are truly enormous. In Great Britain, if an inch fall in a day, it is considered a very heavy rain. In many parts of the Highlands of Scotland, 3 in. not unfrequently fall in one day. On Dec. 5, 1863, there fell at Portree, in Skye, 12½ in. in 13 hours; and on the same day, 5.2 in. fell at Drishaig, near loch Awe, where also, two days afterward, 7.12 in. fell in 30 hours. At Seathwaite, in Borrowdale, 6.62 in. fell on Nov. 27, 1845. But it is in continental, and especially tropical countries, where the heaviest single showers have been recorded. The following are a few of the most remarkable: At Joyeuse, in France, 31.17 in. fell in 22 hours; at Geneva, 30 in. in 24 hours; at Gibraltar, 33 in. in 26 hours; on the hills above Bombay, 24 in. in one night; and on the Khasia hills, 30 in. on each of five successive days.

In all places within the tropics where the trade-winds are blowing regularly and steadily, rain is of rare occurrence, the reason being, that as these winds come from higher latitudes, their temperature is increasing; and hence they are in the condition of taking up moisture rather than of parting with it; and the return trade-winds, which blow above them in an opposite direction, having discharged the greater part of their moisture in the region of the calms, are also dry and cloudless. Where, however, these winds are forced up mountain-ranges in their course, as on the e. of Hindustan, they bring rain, which falls chiefly during night, when the earth's surface is coolest. The region of calms is a broad intertropical belt about 5° in breadth, characterized by calms, and toward which the northern and southern trades (see TRADE-WINDS) blow. This, the region of calms, is at the same time the region of constant rains. Here the sun almost invariably rises in a clear sky; but about mid-day clouds begin to gather; and in a short time the whole face of the sky is covered with dense black clouds, which pour down prodigious quantities of rain. Toward evening, the clouds disappear, the sun sets in a clear sky, and the nights are serene and fine. The reason of this daily succession of phenomena in the belt of calms is, that there the air, being heated to a high degree by the vertical rays of the sun, ascends, drawing with it the whole mass of vapor which the trade-winds have brought with them, and which has been largely added to by the rapid evaporation from the belt of calms; this vapor is condensed as it is raised toward the line of junction of the lower and upper trade-winds, and the discharge is in some cases so copious, that fresh water has been collected from the surface of the sea. As evening sets in, the surface of the earth and the superincumbent air are cooled, the ascending currents cease, the cooled air descends, and the dew-point is consequently lowered, clouds are disipated, and the sky continues clear till the returning heat of the following day brings round a recurrence of the same phenomena. Since the belt of calms, which determines the rainy season within the tropics, moves northward or southward with the sun's declination, carrying the trade-winds with it on each side, it follows that there will be only one rainy and one dry season in the year at its extreme northern and southern limits; but at all intermediate places there will be two rainy and two dry seasons, at the equator these will be equally distant from each other.

This state of things is only of strict application to the Pacific ocean, whose vast expanse of water, presenting a uniformly radiating and absorbing surface, is sufficient to allow the law to take full effect. But over the greater part of the earth's surface disturbing influences draw the trade-winds more or less out of their normal course, and sometimes produce a total reversal, as in the case of the monsoons (q.v.). These winds determine entirely the rainfall of India, and but for them the eastern districts of Hindustan would be constantly deluged with rain, and the western parts constantly dry and arid. As it is, each part of s. Asia has its dry and wet season, summer being the wet season of the western parts and interior as far as the Himalaya, and winter the wet season of the eastern, and especially south-eastern parts.

The heaviest annual rainfall on the globe is 527 in., at Cherra Punji, on the Khasia hills, 494 in. of which falls from April to September during the s.w. monsoon. This astonishing amount is due to the abruptness of the mountains which face the bay of Bengal, from which they are separated by 200 m. of low swamps and marshes. The winds not only arrive among the hills heavily charged with the vapor they have absorbed from the wide expanse of the Indian ocean, but being near the point of saturation, their temperature not being raised in passing over these swamps, they are, so to speak, ready to burst in torrents over the abrupt cliffs which divert them from their horizontal course into the higher regions of the atmosphere. At 20 m. inland, the annual fall is reduced to 200 in.; 30 m. further s., it is only 100 in.; n., at Gowhatty in Assam, it is only 69 inches. In the n.w. of the bay of Bengal, at Cuttack, it is only 52 in.; while in the n.e., in Arracan, owing to the s.w. direction of the winds, it is from 200 to 240 inches. At Madras the annual fall is 48 in.; at Seringapatam, only 24 in.; at Bombay, 71 in.; at Uttra-Mullay, 263 in., and at Mahabalishwar, 254 in., both on the western Ghauts; and at Poona inland, 27 inches. The s.w. monsoon discharges from 50 to 90 in. of rain over the parts of Hindustan not bounded by high mountains to the w., before reaching the Himalayas, after which it discharges the greater part of its moisture, 120 to 140 in., on the outer Himalayan range, at elevations of 4000 to 8000 feet. Thus, four times more rain falls annually on the Khasia hills than on the Himalaya, owing to the less abrupt face these latter mountains present to the s., to the sandy burning plain, which raise the winds considerably above the dew-point, and to the larger tract traversed by the winds, over which their moisture continues to be discharged as they pass.

The following are a few of the annual rainfalls in the tropics: Singapore, 97 in.; Canton, 78 in.; St. Benoit (Isle of Bourbon), 163 in.; Sierra Leone, 126 in.; Caracas, 155 in.; Pernambuco, 106 in.; Rio Janeiro, 45 in.; Georgetown, 95 in.; Barbadoes, 50 in.; St. Domingo, 107 in.; Bahamas, 55 in.; and Vera Cruz, 183 inches. In many places in the interior of continents within the tropics, the rainfall is small—not greater, in fact, than in temperate countries, such as the eastern parts of England. At Poona, only 23 in. fall annually.

The periodicity of the rain-fall disappears as we recede from the tropics, and the times of the year during which it occurs are different—the greater quantity falling in summer at places within the tropics and in the interior of continents, but in winter in countries bordering on the sea in temperate regions. In respect of the rain-fall, Europe may be divided into two distinct regions: Western Europe and the countries bordering on the Mediterranean. A vast ocean on the one hand, a great continent on the other, and a predominance of w. winds, are the determining circumstances in the distribution of the rain-fall over western Europe. As the s.w. winds, which are the return trades, descend to the earth and blow over the surface of Europe, and as the whole of this continent is thus within their influence, it follows that the western parts, especially where mountain-ranges stretch n. and s., are rainy districts; for these mountains, diverting the s.w. winds from their horizontal course, force them up into the higher regions of the atmosphere, where, chilled, they form into clouds, or deposit in rain the vapor they can no longer hold in suspension. Hence the rainiest regions of Europe are Norway, Ireland, the w. of Great Britain and of France, Spain, and Portugal. At the Stye, in the lake district, 38.9 in. fell in Jan., 1851; at Drishaig, 33.2 in., and at Portree, 32.4 in Dec., 1863; and in the same month, from 23 to 30 in. at many other places in the Scottish Highlands. In the w. of Great Britain and Ireland, in the vicinity of high hills, the average rain-fall is from 80 to 128 inches. At Bergen, in Norway, it is 70 in.; in the peninsula, at Oporto, it is 54 in.; at Bilbao, 47 in.; and at St. Jago, 65 in.; and in France it is 51 in. at Nantes and 49 at Bayonne. At places at some distance from hills, and in more inland districts, the annual fall is much diminished. Thus, in the w. of Great Britain, away from hills, it is from 30 to 45 in., while in the e. it is from 20 to 28 inches. In France it averages 30 in.; and in the plains of Germany and Russia, 20 in.; while in some parts of Sweden and Russia it falls as low as 14 inches. In the interior of Europe, in mountainous districts, it rises much above these amounts; thus at Ischl it is 62 inches. An important distinction between the mode of distribution of the rain-fall in the w. of Europe and that of more inland places is that the greater part of the annual amount in the w. falls in winter; but in the interior in spring or summer. This difference is particularly striking on the different sides of Great Britain, and arises from this circumstance, that, as the clouds are much lower in winter, they are arrested and drained of their moisture by the less elevated hills, leaving little to be deposited eastward; but in summer being high they pass above and discharge themselves in the interior. Thus for every 10 in. of rain which fall at the following places in winter, there fall in summer respectively 8¼ in. in the w. of Great Britain, 11 in. in the e. of Great Britain and w. of France, 15 in. in the e. of France, 20 in. in Germany, and 27 in. in the n. and e. of Russia.

The peculiarity of the rain-fall of the basin of the Mediterranean depends on its proximity to the burning sands of Africa, a predominance of northerly winds, and the position of the Pyrenees and Spanish sierras to the w., on which the s.w. winds discharge their rains before arriving on the n. shores of the Mediterranean. In the valley of the Rhone four times more rain falls in autumn than in summer; and s. of the Alps six times more rain falls with the n.e. than with the s.w. winds, being the reverse of what takes place in England. In Italy the quantity diminishes as we approach the south. On the coasts of the Mediterranean it rarely rains in summer, but frequently in winter. In the valley of the Rhone the annual fall ranges from 20 in. at its mouth to 63 in. at St. Rambert, the average being 30 inches. This is also the average of the valley of the Po; but on ascending to the Alps it rises, as at Tolmezzo, to 96 inches.

The rain-fall in the w. of the American continent is distributed similarly to that of Europe—the amount being dependent on the physical configuration of the surface over which the westerly winds blow. The yearly amount increases as we proceed northward; thus at San Francisco it is 21 in.; at Fort Reading, 29 in.; at Fort Oxford, 72 in.; at Fort Vancouver, 47 in.; at Astoria, 86 in.; at Steilacoom (Washington territory), 54 in.; and at Sitka, in Alaska, 82 inches.

But in the United States the manner of the distribution of the rain is very different from that of Europe. The United States are dependent for their rain not on the Pacific ocean, but on the gulf of Mexico. There can be little doubt that, but for the high range of the Rocky mountains in Central America, the greater part of the states would be an arid waste. These mountains are so high as to present an effectual barrier to the passage of the trade-winds which blow over the gulf of Mexico; they are, on this account, turned northward, and spread themselves over the states, especially over the low basin of the Mississippi. These winds being characterized by great heat, and loaded with much moisture from the warm waters of the gulf of Mexico, tend to disturb the statical equilibrium of the atmosphere. When they have blown for some time, vast accumulations of heat and moisture take place, the equilibrium is destroyed, a great storm arises in consequence, sweeping eastward over the states, and in many cases crossing the Atlantic and descending with violence on western Europe. In the states, the southerly winds preceding the storm give place to the dry n.w. winds, which rapidly clear the sky and bring brilliant bracing weather in their train. It appears, in short, that the s. winds from the gulf of Mexico spread the moisture over the states, and the n.w. wind disengages this moisture from them by getting below them, by their greater density, and thrusting them into the higher regions of the atmosphere. If this be the case, as the phenomena seem to warrant, then the heaviest rain-falls will be in the valleys, and the least on the higher grounds—a mode of distribution quite different from what prevails in Europe. And such is really the case, for the greatest amount of rain falls in Florida, the low flats of the Mississippi, then along its valley, and lastly in Iowa, or in that remarkable depression at the head of the river; and the least quantities on the Alleghanies, especially on their higher parts, and on the high grounds of the Missouri district. The following figures, giving the average annual amount in inches, show this in a clear light: Pensacola, 57; Fort Brooke, 55; and Fort Pierce, 63—in Florida: Monroeville, 66; and Mobile, 64—in Alabama: Natchez, 58; Jackson, 53—in Mississippi: Rapides, 68; New Orleans, 52—in Louisiana: Savannah, 48—in Georgia: Nashville, 55—in Tennessee: Dubuque, 33—in Iowa. At Athens, in Georgia, s. of the Alleghanies, the amount is 36 in.; at Alexandria, in Virginia, also 36 in.; and at Jefferson, in Missouri, 38 inches. In the northern states the quantity diminishes at most-places to between 27 and 45 N., and the mode of its distribution becomes assimilated to that of Europe.

When rain-drops fall through a stratum of air below 32°, they become frozen, and form *hail* (q.v.). When the vesicles are formed in air under 32°, *snow* (q.v.) is the result.

RAIN'BOW. The ordinary phenomena of the rainbow are usually visible on every occurrence of a "sunny shower," and we need not describe them particularly until we deduce them, one after another, from their cause. The most careless observation shows us that, for the production of a rainbow, we must have a luminous body of moderate angular diameter, and *drops* of water; for it is never seen except by direct sun or moon light, and never in a cloud unless rain be falling from it. Now, a falling drop of water takes, by its molecular forces, a *spherical* form. Also, as there is separation of the various colors of which white light is composed, the cause of the phenomenon must involve *refraction* of light (q.v.), because by reflection (q.v.) these colors are not separated. But, again, the spectator who views the rainbow has his back to the sun, and rays of light merely refracted by a rain-drop could not be thus sent back to the spectator. The phenomenon must therefore depend upon successive reflections and refractions, and we shall investigate in an elementary manner what appearances we ought to *expect* as the result of such processes according to the known laws of optics; merely premising that the fundamental points of the explanation were first given by Newton in the second book of his *Optics*.

First, then, let us consider what becomes of parallel rays of light, *of one color* or refractive index (see REFRACTION), which are successively refracted and reflected in a single spherical rain-drop.

For our immediate purpose it is sufficient to suppose that the refractive index (see REFRACTION) of water is $\frac{4}{3}$; that is, the incident and refracted rays make with the perpendicular to the refracting surface of water, angles whose sines are in the ratio of 4 to 3.

Let the circle represent a section of the drop made by *any* plane passing through its center O, and the line SO, which joins its center with the sun; the sun being supposed, for the moment, to be a single luminous point, situated at so great a distance that lines drawn to it from different points of the drop are parallel. A ray of light, SB, falling on the drop in the plane of section will be, of course, partly reflected and partly refracted at B. The reflected part does not concern us, as in it all colors would travel together; and, in fact, the result of reflection from the external surfaces of the drops is simply to illuminate the background feebly. Join OB, and produce it to Q. Then the refracted ray (see REFRACTION) will have in the drop the direction BA, where the ratio of the sines of SBQ and OBA is the refractive index of water—i.e., 4 : 3 nearly. Arriving at A the ray will be partly refracted in some such direction as AD, and the rest reflected in the direction AC. Now AD obviously cannot fall on the eye of a spectator whose *back* is turned to the sun, and it has, therefore, nothing to do with the rainbow. The internally reflected ray AC, on reaching the surface at C, is partly refracted in the direction CT (where BS and CT are symmetrically situated on opposite sides of OA), and partly reflected internally. The latter portion we must consider when we come to the cause of the *secondary*, or outer rainbow, the former is that which at present concerns us. Let SB_1, SB_2, be other incident rays. After a refraction, a reflection, and a second refraction, they emerge in the directions C_1T_1, C_2T_2, respectively. From the figure, which is drawn from calculation, it is obvious that both C_1T_1 and C_2T_2 are *less* inclined to OS than CT is. Hence for rays, parallel to SO, falling on the drop, and emerging after suffering two refractions and a reflection, the *final* direction is more and more

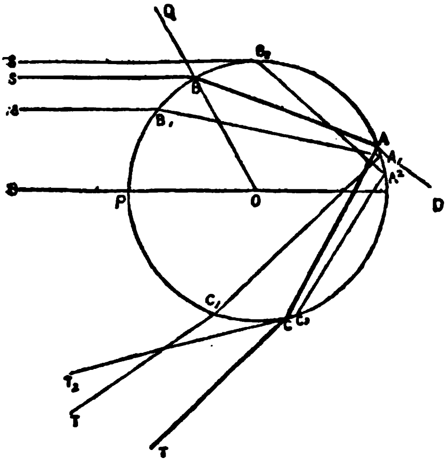


FIG. 1.

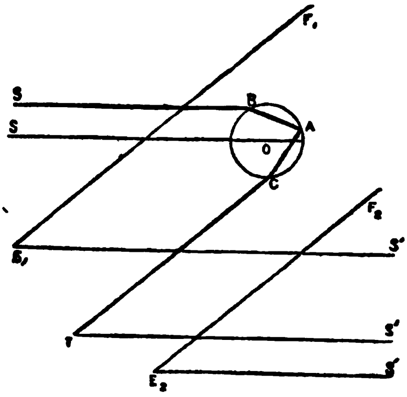


FIG. 2.

inclined to SO, as the point of incidence, B_1, is further from P, at least up to some such point as B; after which (for points situated as B_2) it diminishes again. By proper mathematical methods it is easy to find that the angle SOB is about 59° 24′, if the refractive index be $\frac{4}{3}$. Now, by a general property of maxima or minima in optics (see CAUSTIC), the rays falling on the drop near to B will emerge nearly parallel to CT; while those incident near any other point (as B_1) will be widely scattered at emergence. And we may evidently extend this reasoning to all other rays by supposing the above figure to rotate about the axis SO.

The conclusion is, therefore, that if homogeneous light fall in parallel lines on the spherical drop, those rays which have been *twice* refracted at the surface, and *once* internally reflected, will, on emergence, all lie within the cone formed by the revolution of CT about SO, and will be *condensed* toward the surface of that cone. Hence such an illuminated drop gives off by this particular process a solid cone of rays, much condensed toward its external boundaries.

So much for each drop. Next, let us inquire what the appearance will be to an eye in any given position. Referring to the next figure, in which the letters are the same as in the former, draw TS′ parallel to SO. Then TS′ is the direction of the line drawn to the point on the heavens diametrically opposite to the sun. So are E_1S_1' and E_2S_2', drawn from any assumed positions, E_1 and E_2, of the spectator's eye.

If the eye be placed in the surface of the cone just described, as at T, it will receive the condensed ray which emerges in the direction CT; if at E_1 (within the cone), it will receive diffused rays from the drop; if at E_2 (outside the cone), it will receive no light at all.

To put this in a simpler form: Draw E_1F_1 and E_2F_2 parallel to TC; then we may evidently say that the eye receives a condensed light from any drop whose angular distance from the point opposite the sun is CTS′, a diffused light if the angular distance be less than this, and none at all if it be greater. By methods already alluded to, it is found that CTS′ is nearly 42° 12′ for the index of refraction $\frac{4}{3}$.

Hence, if the sun were a luminous point, emitting homogeneous light whose index of refraction in water is $\frac{4}{3}$, a spectator looking through a shower of falling raindrops toward the point immediately opposite to the sun, would see a bright circle of angular diameter 84° 24′ surrounding this point, diffused light within that circle, and darkness without it.

The effect of the finite angular diameter of the sun is evidently to widen this circle into a circular luminous band, whose breadth is the sun's apparent diameter, and whose mean radius is 42° 12′.

Next, let us consider the different refrangibilities of the colored constituents of white light. The investigation above hinted at shows that the radius of the luminous circular band is greater, the less the refractive index; the proof, though very simple, would be out of place in this work. Hence the appearance actually observed with sunlight will be formed by the superposition of concentric, overlapping, circular bands, the radii being less and less as we consider the primary colors in the order from red to violet (see SPECTRUM). That is, we shall have a circular illuminated space, brightest toward the edge, with a homogeneous red ring as its external boundary, and a gradual mixture of the prismatic colors as we look nearer to the center. This agrees very well with observation, and so do the calculated diameters of the external red (42° 22′) and internal violet (40° 35′) rings.

But what becomes of the light *twice* reflected inside the drop, and then refracted out? Let fig. 3 represent again a section of the drop, with sunlight falling on it in lines parallel to SO, and let us trace the course of one ray, as SB. The part reflected at B is to be disposed of as before; it goes merely to illuminate, feebly, the otherwise dark background of cloud and vapor. The refracted portion proceeds, as before, to A, where part is reflected internally along AC, and part refracted out. The latter portion, as we have already seen, cannot possibly reach the eye of a spectator whose back is turned to the sun. Similarly, at C, there is internal reflection along CD, and refraction out of the drop. The refracted part has already been considered, as the cause of the *primary* rainbow. The reflected part will again at D be separated into two; one, reflected internally, which proceeds to form the tertiary and higher orders of bow; and the other, escaping from the drop in the line DT, which goes to form the *secondary* bow. This we will consider with some care, because the secondary bow, though necessarily fainter

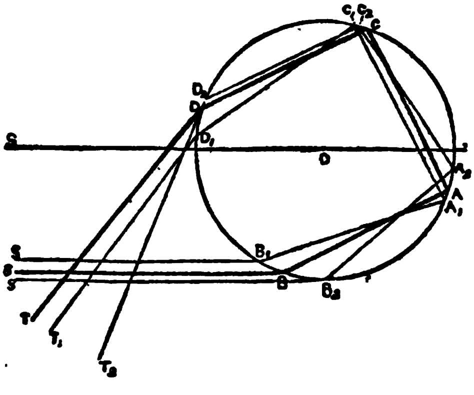


FIG. 3.

than the primary, is usually seen; the tertiary and higher bows, each much fainter than the preceding one, since the beam inside the drop is weakened at each succeeding reflection, require no notice, as even the tertiary has never been observed in nature.

As before, we have traced the courses of two other beams, SB_1 and SB_2, in their passage to form part of the secondary bow. They are respectively $SB_1A_1C_1D_1T_1$ and $SB_2A_2C_2D_2T_2$; and the figure shows us that the final rays D_1T_1 and D_2T_2 are each *more* inclined to SO than DT is. There is, therefore, a particular ray, SB, whose final direction, DT, is *less* inclined to SO than that of any other ray which has suffered two refractions and two internal reflections; and, as before, the emergent light is condensed toward this minimum. If, then, the figure be made to revolve about SO, we see that DT will describe a cone, that *inside* this cone there is no refracted light, that toward the surface of the cone, part of the light is condensed, and that the rest of it is diffused through *exterior* space.

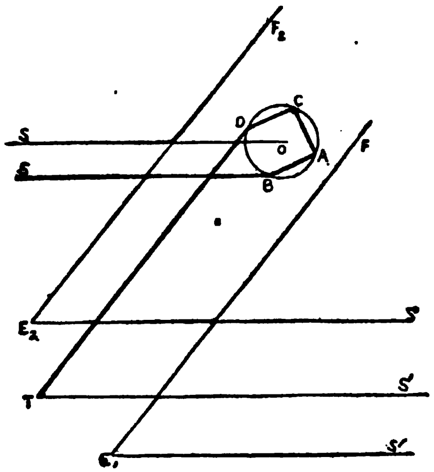


FIG. 4.

So much for one drop; let us now, as before, consider what will be seen by an eye in any position with regard to this particular drop. In fig. 4, the letters denote the same things as in fig. 3. Hence if the eye be placed at T, it will receive the maximum of light, in a direction making an angle DTS' with the point in the heavens opposite to the sun. If at E_1, it will receive some of the diffused light from a drop whose angular distance from the point opposite the sun is *greater* than DTS'; and if at E, it will receive no light at all, the drop's angular distance from the point opposite the sun being *less* than DTS'. Hence the appearance presented by a shower of drops is, for homogeneous light coming in parallel lines, a bright circle, whose angular radius is DTS'; diffused light outside that circle, and no light within it. When the light comes from a source of finite angular diameter, as the sun, the only effect is, as in the primary bow, to *widen* the bright circular band. When we consider the various components of white light, calculation shows us that DTS' is least for red, and greatest for violet. Hence we have a series of concentric colored bands superposed, their diameters increasing from the red to the violet. Hence the secondary rainbow has its inner edge red, and its outer violet; the intermediate space being an exceedingly mixed, or impure spectrum (q.v.). The results of geometrical optics show us that the angular diameter of the red is 100° 48′, and of the violet 106° 44′; so that the breadth of the bow is 3° 30′ nearly.

In nature, these rough results are pretty closely verified; but a more profound investigation into the circumstances of the problem shows us some modifications. In the first place, we find that for each kind of homogeneous light the actual maximum of brightness is in a circle of rather less angular diameter than that given by the more elementary investigation for the primary bow, and rather greater for the secondary. Secondly, and still with homogeneous light, there is a succession of feebler and feebler concentric circles of maximum brightness—inside the principal maximum in the primary bow, and outside it in the secondary. These give rise to what is always seen in a fine rainbow, the so called *spurious* or *supernumerary* bows, lying close inside the violet of the primary bow, and outside that of the secondary. These are fainter and more impure as they proceed from the principal bow, and finally merge into the diffused white light inside the primary bow, and outside the secondary.

The angular dimensions of these bows, principal and spurious, were calculated from theory by Airy, and carefully measured by Miller in the artificial bow formed by passing light through a very fine column of water descending through a small aperture, and the accordance was perfect.

The lunar rainbow, which is a comparatively rare, but very beautiful phenomenon, differs from the solar simply in the source and intensity of the light by which it is produced; and, as in all cases of feeble light, the distinction of the colors is very difficult. In fact, except under the most favorable circumstances, the lunar rainbow rarely shows colors at all, giving a pale ghostly gleam of apparently white or yellow light.

RAIN-GAUGE. The use of rain-gauges is to ascertain the amount of rain which falls at any given place. They are of various constructions. The simplest is that which consists of a metallic cylinder, from the bottom of which, a glass tube, divided into inches and parts of an inch, projects downward. It is provided with a funnel, inserted within at the top, to prevent evaporation, and the rain-water is emptied out by means of a stop-cock at the bottom, or, still simpler, by a hole pierced in the funnel at the top. As this form of gauge is objectionable on account of the frequent breakage of the glass-tube by frost, a float is used instead, which is raised by the water, and a scale is attached to it, to show the quantity of rain received. As this gauge does not admit of very nice readings, another sort is frequently employed, viz., a receiving-vessel and a glass measure of much smaller diameter, which thus admits of as nice graduation as may be desired. As, practically, there is often great difficulty or trouble experienced in replacing the glass measure when it chances to get broken, the late G. V. Jagga Ráo, a wealthy zemindar of Vizagapatam, proposed a gauge in the form of a funnel having a diameter of 4.697 in., or an area of 17.33 sq.inches. Now, as a fluid ounce contains 1.733 cubic in., it follows that for every fluid ounce collected by this gauge, the tenth of an inch of rain has fallen. This measure can of course, be graduated to any degree of nicety, and may be reproduced at pleasure. It has also the great merit of being by far the cheapest gauge, costing only 4s. 6d. Self-registering rain-gauges have been invented by Osler, Crosley, and Beckly, but they are too expensive to come into common use.

A most important point with regard to the rain-gauge is its height above the ground. Prof. Phillips found the fall of rain at York for 12 months in 1833–34, to be 14.96 in. at a height of 213 ft. from the ground; 19.85 in. at 44 ft.; and 25.71 in. on the ground. This remarkable fact—viz., that different quantities are collected at different heights, the amount being always greater at the lower level, has been confirmed wherever the experiment has been made. No perfectly satisfactory account has yet been given of this singular phenomenon. The condensing of the vapor of the atmosphere on the surface of raindrops as they fall—the rebound of the finer particles into which many of the drops break themselves as they strike with violence on the ground—and the eddies and currents which prevail most and strongest around isolated objects raised above the surface of the ground, to a large extent account for the phenomenon. Of these three, the greatest weight is to be given to the last two; and this is confirmed by the fact, that a gauge placed on the roof of a building that happens to be flat, of considerable area, and with few or no chimney-stalks to disturb the air-currents, collects an amount equal to that collected at the same place by a gauge on the ground. The proper size and shape of the rain-gauge, and its height above the ground, so as to measure with the greatest exactness possible the real quantity of rain that falls, about all of which much diversity of opinion exists, have been ably investigated by series of extensive experiments conducted by maj. Ward, Mr. Symons, rev. Charles Griffith, and others, and the results have been published annually in Symons's *British Rainfall.*

RAIN-PRINTS, small pits observed on the surfaces of some argillaceous rocks, and believed to be the impressions of rain-drops. See ICHNOLOGY.

RAINS, a co. in n.e. Texas, drained by the Sabine river and the Lake fork, crossed by the Texas and Pacific railroad; about 225 sq.miles. The surface is hilly. The soil is fertile. The chief productions are corn, cotton, tobacco, and cattle. Co. seat, Emory.

RAINY LAKE forms a portion of the boundary-line between British North America and the United States. It is situated 160 m. w. of lake Superior, is 1160 ft. above sea-level, and is about 35 m. long, and 5 m. in average breadth. Its surplus waters are carried off to the Lake of the Woods, in a w.n.w. direction, by the Rainy river, which is about 100 m. in length, and the banks of which are covered with pine-forests.

RAI SANYO, 1780–1833; the greatest of Japanese historians. His works contributed greatly to form the opinions of the men who in 1868, backed by public sentiment, overthrew the tycoon and the dual system of government. His greatest work, upon which he labored for 20 years, is the *Nihon Guaishi*, or Military History of Japan. It is in 22 vols., and narrates the history of Japan from the 12th to the 17th c., as shown in the rise to power, and decay of the great military families whose chiefs were called shōguns, or generals; afterward by foreigners called "Tycoons." His other work was posthumously published, and treats of the history of Japan from 660 A.D. to the end of the 16th century. Portions of the *Guaishi* have been translated into English by Mr. Ernest Laton of the British legation. For the preparation of his great work Rai sifted over 650 native books, some of them very detailed and voluminous. The unmistakable animus of his works is to show that the mikado alone is and always was the sovereign of Japan, and that the shōguns were usurpers.

RAISED SEA-BEACHES. See BEACHES RAISED.

RAISINÉE, a *rob*, or sweetmeat, much esteemed in France, made by boiling new wine, and skimming until only half the quantity of wine remains; after which it is strained; apples, pared and cut into quarters, are added to it, and it is allowed to simmer gently, till the apples are thoroughly mixed with the wine, when it has a very pleasant sweetish-acid taste. Cider may be used instead of wine.

RAISINS are dried grapes, prepared by two different methods. The one method consists in partially cutting through the stalk of the ripened bunches, and allowing them to shrink and dry upon the vine by the heat of the sun. These are by far the better sort, and are called *raisins of the sun*, or muscatels. Malaga is much celebrated for its sun-raisins, which are the finest in the world. The raisins prepared by the other method are called *lexias*, and are gathered and hung on lines, or laid on prepared floors to dry in the sun. When dried, they are dipped in a hot *lye*, made by dissolving the alkali out of wood-ashes or barilla with water, until the filtered fluid has a specific gravity of about 1.100; to this is added, for every four gallons, a pint of olive oil and a quarter of a pound of salt. After dipping, the fruit is laid on hurdles of wicker-work to drain, and is continually exposed to the sun for about a fortnight. The raisins are then pulled from the stalks, and packed into boxes for transport to other countries. The qualities best known in the markets are Valencias and Denias from Spain, Malagas from Malaga, and black Smyrnas and Sultanas from Asiatic Turkey. The currant (q.v.), or corinth, as it was originally called, is only a small variety of grape peculiar to the Greek islands, cured in the same way, and in itself forming a large staple of those islands. In 1875 Britain imported 27,575 tons of raisins, and currants to the amount of 53,140 tons.

RÂJAH, or more correctly **RÂJÂ** (from the Sanskrit *râjan*, king, cognate with the Latin *reg* of *rex*), is originally a title which belonged to those princes of Hindu race who, either as independent sovereigns or as feudatories, governed a territory; it then, however, became a title given by the native governments, and, in later times, by the British government to Hindus of rank, and it is now not uncommonly assumed by the zemindars or land-holders; the title mahârâjah, or "great râjah," being, in these days, generally reserved to the more or less independent native princes. According to the ancient social system of India, the râjah belonged to the kshattriya or military caste (see CASTE); now, however, the title is given to, and assumed by members also of an inferior caste.

RA'JAMAHE'NDRI, or RAJAMUNDRY, a t. of Hindustan, capital of the district of Godavari, in the presidency of Madras, stands on the left bank of the Godavari, about 50 m. from the mouth of that river, and in long. 81° 58' east. To the n. of the town is the fort, a square edifice, comprising the barracks, hospital, jail, and magazine. The nobler kind of game, as well as wild-fowl of all sorts, abound in the vicinity, and the situation and scenery are in the highest degree beautiful. The Godavari is here about 2 m. wide, and is crossed by a steam-ferry. Napkins and table-cloths are manufactured. Pop. 19,738, about a fourth of whom are Brahmans. The collectorate of Godavari, of which Rajamahendri is the capital, has an area of 6,224 sq.m., and a pop. ('71) of 1,592,939.

RÂJATARANGIN'Î (or "the river of kings," from the Sanskrit *râjan*, king, and *tarangin'î*, a river or stream) is the name of four chronicles of the history of Cashmere written in Sanskrit verse; the first by *Kalhan'a*, bringing the history of Cashmere till about 1148 after Christ; the second, a continuation of the former, by *Jonarâja*, to 1412; the third, a continuation of the second, by *S'rîvara*, a pupil of Jonarâja, to 1477; and the fourth, by *Prâjyabhat't'a*, from that date to the conquest of the valley by the emperor Akber. Among these chronicles, however, it is especially the first which has earned a great reputation, inasmuch as it is the most important and the completest of all *known* Hindu chronicles, and, for this reason, may be considered as the only surviving work of Sanskrit literature which betrays an attempt at historiography. The author of the work, the Pandit Kalhan'a—of whom we merely know that he was the son of Champaka, and lived about 1150, under the reign of Sinhadeva of Cashmere—reports that before entering on his task, he had studied 11 historical works written previously to his time, and also a history of Cashmere by the sage Nîla, which seems to be the oldest of all; but that, not yet contented with these sources of information alone, he had also examined old documents, such as grants and proclamations made by kings, texts of laws, and sacred books. It may be presumed, therefore, that Kalhan'a had not merely the desire, but set honestly to work to elucidate the history of Cashmere up to his date. And so far as the last few centuries preceding him are concerned, it is possible that the facts narrated by him are reliable; but, owing to the uncritical disposition of the Hindu mind in all matters that regard historical facts, those especially of a more or less religious or legendary character, and also to his bias to produce a consistent system of chronology, great doubts must attach to all that relates in his work to the ancient history of India. In spite of these shortcomings, however, which are more those of the nation to which the author belonged, than those of the individual himself, much that is reported by Kalhan'a is the only source of information we have of the history of Cashmere, and much very valuable as coming from an indigenous source. Kalhan'a begins his work, as may be expected, with the mythological history of the country; the first king named by him is Gonarda, who, according to his chronology, would have reigned in the year 2448 before Christ; and the last mentioned by him is Sinhadeva, about 1150 after Christ. The Sanskrit text of the complete work, together with that of the three other Râjatarangin'îs, which is of little extent, has been edited at Calcutta, 1835, under the auspices of the general committee of public instruction and the Asiatic society of Bengal. Six sections of it have been edited with notes, and learned appendixes, in French, by A. Troyer, who likewise translated into French these sections, as well as the remaining two (*Râdjataranginî, Histoire des Rois du Kachmir*, etc., vols. i. to iii., Paris, 1840–52).—See also H. H. Wilson, *An Essay on the Hindu History of Cashmir*, in the *Asiatic Researches*, vol. xv., and Lassen's *Indische Alterthumskunde*, vols. i. and ii.

RAJMAHAL', a t. of India, in the district of Bhaugulpore, Bahar, lower provinces of Bengal, and a station on the line of railway from Calcutta to the n. w. frontier, stands on a steep eminence on the right bank of the Ganges, 200 m. by land n.n.w. of Calcutta. Its position is advantageous, and it was long the chief town of the Bengal and Bahar provinces. Since the removal of the British courts of justice, however, its prosperity has declined. It now presents a deserted and ruinous appearance, but is still noteworthy for the remains of its once splendid palace, and for its important transit-trade. It contains twelve market-places, and has about 30,000 inhabitants, most of whom are employed in providing for the wants of the vast number of travelers who pass through the town by land and water.

RÂJPOOTS, or Râjputs (from the Sanskrit *râjan*, king, and *putra*, son; hence literally, "sons of kings"), is the name of various tribes in India which are of Aryan origin, and either descended from the old royal races of the Hindus, or from their Kshattriya or warrior caste (see Caste). At all periods they seem to have played a conspicuous part in the history of India; and all over Hindustan there are many families who, rightly or wrongly, claim the title of Râjputs. At present they occupy chiefly the country known as Râjasthân or Râjputana, including, among other states, those of Mewar, Marwar, Jeypur, Bikanir, Jessulmir, Kotah, and Bundi. Before the invasion of Mahmud the Ghiznevide, four great kingdoms were under the dominion of Râjput families—viz., Delhi, Kanoj, Mewar, and Anhulvarra; and all the kings mentioned in the *Râjataranginî* (q.v.) of Kalhana were of Râjput origin.—For the history, etc., of the Râjpoots, and the geography of Râjputana, see col. James Tod's *Annals and Antiquities of Râjasthân, or the Central and Western Râjpoot States in India* (2 vols., Lond. 1829); Ritter's *Erdkunde*, vol. vi. pp. 724, ff.; Lassen's *Indische Alterthumskunde*, vols. i. and ii. (*passim*); A. Troyer's *Râjataranginî*, vol. iii. (*Eclaircissements historiques*, etc.).

RAKE, an agricultural and horticultural implement, in use from very ancient times. In its simplest form it consists merely of a bar of wood or iron, with wooden or iron teeth inserted into it, and attached at right angles across the end of a long handle. It is used for collecting straws, etc., from a field after it has been reaped or mown, or stones from newly tilled ground, sometimes also in gardens, for covering seeds. A long rake, with a short triangular framework instead of a handle, and curved teeth, is much used in hay-fields in England, and is known as the *ell-rake*. Rakes are also adapted for being drawn by horses, and there are many modifications both of the hand-rake and the horse-rake.

RAKE, in naval language, has more than one meaning. The rake of a ship's stern or bow is the length to which the keel would have to be prolonged to bring it under the most projecting point of the stern or bow. Raking masts are masts set aslope, so that the angle they make with the keel toward the stern is less than a right angle, as in a brigantine. To rake a ship is to bring guns to bear so as to fire them along her deck from end to end; this is the most disastrous thing that can happen to a vessel in action, and it is the object of all good seamanship to avoid it. When a ship is raked at short range, grape can be used with great and fatal effect.

RAKING MOLDING, a molding not horizontal or vertical, but sloping at an angle. When joined to a horizontal molding, the raking molding is run so as to miter with the true vertical profile of the former, and is therefore different from it in section.

RAK'OCZY, a family of Hungarian nobles in Transylvania, of whom the most distinguished was Francis II., 1676–1735. In 1701 he was imprisoned on an accusation of conspiracy to incite rebellion, but he escaped to Poland, raised a band of revolutionists, gained possession of Hungary and Transylvania, and was in the pay of Louis XIV. in the war of the Spanish succession. In 1705 the insurgent parts of Hungary united themselves in a confederation, and placed Rakoczy at the head. In 1708 he was defeated by the Austrians; dissensions sprang up in the confederation, and during his absence in Poland, 1711, a treaty of peace was negotiated between Austria and the confederation. He died in Turkey. He gave an account of the Hungarian insurrection in his *Mémoires sur les Révolutions de Hongrie*, 1738.

RAKO'CZYMARSCH, a simple but grand military air by an unknown composer, said to have been the favorite march of Francis Rakoczy II. of Transylvania, and at all events much played in his army. The Magyar Hungarians adopted it as their national march, and in 1848 and 1849 it has been alleged to have had the same inspiriting effect on the revolutionary troops of Hungary as the *Marseillaise* on the French. Like the *Marseillaise* in France, it has been placed under the ban of the Austrian government at various periods of political excitement. In 1848 several attempts were made by Hungarian poets to set it to appropriate verses, but without much success. The air most generally known in Germany and elsewhere out of Hungary as the Rakoczymarsch, which is introduced by Hector Berlioz in his *Damnation de Faust*, is a weak paraphrase of the original by Ruziska.

RAKSHAS, or Râkshasa, is, in Hindu mythology, the name of a class of evil spirits or demons, who are sometimes imagined as attendants on Kuvera, the god of riches, and guardians of his treasures, but more frequently as mischievous, cruel, and hideous monsters, haunting cemeteries, devouring human beings, and ever ready to oppose the gods and to disturb pious people. They have the power of assuming any shape at will, and their strength increases toward the evening twilight. Several of them are described as having many heads and arms (see, for instance, Râvana), large teeth, red hair, and, in general, as being of repulsive appearance; others, however, especially the females of this class, could also take beautiful forms in order to allure their victims. In the legends of the *Mahâbhârata*, *Râmâyana*, and the *Purân'as*, they play an important part, embodying, as it were, at the period of these compositions, the evil principle on earth, as opposed to all that is physically or morally good. In the *Purân'as* they are sometimes mentioned as the offspring of the patriarch Pulastya, at other times as the sons of the patriarch Kas'yapa. Another account of their origin, given in the *Vishn'u-Purân'a*, where, treating of the creation of the world (book i. chap. v.), is the following: "Next, from Brahmâ, in a form composed of the quality of foulness, was produced hunger, of whom anger was born; and the god put forth in darkness beings emaciate with hunger, of hideous aspects, and with long beards. Those beings hastened to the deity. Such of them as exclaimed: 'Not so, oh! let him be saved,' were named Râkshasa (from *raksh*, save); others who cried out: 'Let us eat,' were denominated from that expression, Yaksha" (from *yaksh*, for *jaksh*, eat). This popular etymology of the name, however, would be at variance with the cruel nature of these beings, and it seems, therefore, to have been improved upon in the *Bhâgavata-Purân'a*, where it is related that Brahmâ transformed himself into night, invested with a body; this the Yakshas (q.v.) and Râkshasas seized upon, exclaiming: "Do not spare it—devour it!" when Brahmâ cried out: "Don't devour me (*mâ mâm jakshata*)—spare me! (*rakshata*)." (See F. E. Hall's note to Wilson's *Vishn'u-Purân'a*, vol. i. p. 82.) The more probable origin of the word *Rakshas*—kindred with the German *Recke* or *Riese*—is that from a radical *r'ish* or *rish*, hurt or destroy, with an affix *sas;* hence, literally, the destructive being.

RA'KOS. See Pesth, *ante*.

RALEIGH, a co. in s. West Virginia, drained by the Kanawha or New river, its e. boundary, and by Coal river and Piney creek; traversed by the Chesapeake and Ohio railroad; 500 sq. m.; pop. '80, 7,367—7,324 of American birth; 71 colored Surface, rough and mountainous; corn, wheat, hay, and dairy products are the staples. Co. seat, Raleigh Court House.

RA'LEIGH, the capital of North Carolina, is six miles w. of the Neuse river, near the center of the state; lat. 35° 47' n., long. 78° 48' west. The town is regularly built on an elevated site, with a central park, containing a large domed state-house and broad streets. It contains a court-house, jail, 3 banks, 12 newspapers, 6 churches, deaf and dumb and lunatic asylums, and extensive railway connections. Pop. '60, 4,780; '70, 7,790.

RALEIGH (*ante*), a city in n. North Carolina, capital of the state since 1794, co. seat of Wake co., called the *City of Oaks;* pop. '80, 14,110. It is on the Raleigh and Augusta railroad, and the North Carolina division of the Richmond and Danville railroad, and is the s. terminus of the Raleigh and Gaston. Its 4 principal streets radiate from a central park of 6 acres, shaded by oak trees, in which stands the state-house 166 ft. long by 90 ft. wide, built of granite, 3 stories in height, with a handsome front of massive columns, erected at a cost of $500,000. A state-house, which contained a statue of Washington by Canova, was burned in 1831. Another costly structure is the U.S. court-house and post-office, of white Salisbury granite. The city contains several educational institutions supported by the different denominations, including the Raleigh female seminary for girls; also public schools for white and colored, the Shaw institute for more advanced colored pupils, and a farm school. It has 3 banks with an aggregate capital of $700,000; 10 churches, several of them supported by colored people; a geological museum; 2 libraries at the state-house, one a law library of 4,000 vols.; and a state library, 25,000 vols. It is the center of a fertile agricultural region, and is an important cotton market, 40,000 bales of that commodity changing hands here annually; it has also an active dry-goods trade. Its leading industries are the manufacture of iron, tobacco, steam-engines, agricultural implements, lumber, carriages, etc.

RALEIGH, Sir Walter, the son of Walter Raleigh of Fardel in Devonshire, was b. in 1552 at Hayes, on the coast of that county. In 1568, he was sent to Oxford as a commoner of Oriel college, and though his residence there was brief, gave token of remarkable ability. Only the year after, relinquishing study for adventure, he went to France as volunteer in an expedition in aid of the Huguenots; and some years subsequently we find him serving in the Low Countries in a force sent by queen Elizabeth to assist the Dutch in their patriotic struggle against the Spaniards. Of this earlier part of his career nothing specially remarkable is recorded. In 1579 he made his first venture in the field of activity which through life continued at intervals to attract him, sailing, in conjunction with his half-brother, sir Humphrey Gilbert, with the purpose of founding a colony in North America. The expedition proved unsuccessful, being roughly handled by a Spanish force, and obliged to return in somewhat evil case. During the year following Raleigh held a captain's commission in Ireland, where, in operations against the rebels, he distinguished himself by his courage and conduct. Shortly after his return, he seems first to have attracted the notice of queen Elizabeth, with whom he speedily rose high in favor. The story which attributes the commencement of his relations with her to his graceful gallantry in spreading before her his costly mantle as a carpet, is so well-known, that it need only be glanced at in passing. For some years forward he was constant in his attendance upon the queen, who distinguished him by employing him from time to time in various delicate offices of trust, and by substantial marks of her favor. The spirit of enterprise was, however, restless in the man; and in 1584, a patent having been granted him to take possession of lands to be discovered by him on the continent of North America, he fitted out two ships at his own expense, and shortly achieved the discovery and occupation of the territory known as Virginia, a name chosen as containing an allusion to the "virgin-queen" herself. Elizabeth also conferred on Raleigh the honor of knighthood. If we except the questionable benefit —with which Raleigh's name remains connected—of the introduction of tobacco into Europe, no immediate good came of the colony; and after some years of struggle, during which he sent out several auxiliary expeditions, he was forced to relinquish his connection with it.

During the years 1587–88, the country being menaced by a Spanish invasion, Raleigh was actively and responsibly occupied in organizing a resistance, and held command of the queen's forces in Cornwall. In the latter year he shared with new access of honor in the series of actions which ended in the defeat and dispersion of the great armada, and was thanked and rewarded for his services. Shortly after (1593), in consequence of an intrigue, resulting in his private marriage with Elizabeth Throckmorton, one of the queen's maids of honor, he incurred her majesty's severe, but only temporary, displeasure. In his banishment from court, he recurred to those schemes of conquest and adventure in the new world which formed one main dream of his life; and, in 1595, headed an expedition to Guiana, having for its object the discovery of the fabled El Dorado, a city of gold and gems, the existence of which in these regions was then generally believed in. Of this brilliant but fruitless adventure, on returning, he published an account. Having been reinstated in the royal favor, he held in 1596 the post of admiral in the expedition against Cadiz, commanded by Howard and the earl of Essex, and was admittedly the main instrument of its success. Also, in the year following, he took part in the attack on the Azores made by the same commanders. In the court intrigues which ended in the downfall of the earl of Essex, he after this became deeply involved; and certain points of his conduct, as notably the sale of his good offices with the queen in behalf of such of the earl's adherents as would buy them, though easily regarded by the current morality of the time, have fixed somewhat of a stain on a fame otherwise so splendid.

With the death of Elizabeth in 1603 ends the brilliant and successful portion of Raleigh's career. Her successor James from the first regarded him with a suspicion and dislike which he was at no pains to conceal. He had besides made powerful enemies—the principal of whom were Cecil and Howard. His ruin was resolved on, and means were soon found to compass it. He was accused of complicity in a plot against the king; and though no jot of evidence of his being any way concerned in it was produced at his trial, a verdict was readily procured, finding him guilty of high-treason. The language of the prosecutor, attorney-general Coke, was outrageously abusive. He called Raleigh "a damnable atheist," "a spider of hell," "a viperous traitor," etc. Sentence of death was passed, but James did not venture to execute him; and he was sent to the tower, where, for thirteen years, he remained a prisoner, his estates being confiscated, and made over to the king's favorite, Carr, subsequently earl of Somerset. During his imprisonment, he devoted himself to literary and scientific pursuits, his chief monument in this kind being his *History of the World*, a noble fragment, still notable to the student as one of the finest models of our quaint and stately old English style. Certain of his poetical pieces, giving hint of a genius at once elegant and sententious, also continue to be remembered, and are more or less familiar to every one. In 1615 he procured his release, and once more sailed for Guiana. The expedition, from which great results were expected, failed miserably. Raleigh himself, in consequence of severe illness, was unable to accompany it inland, and nothing but disaster ensued. To add to his grief and disappointment, his eldest and favorite son was killed in the storming of the Spanish town of St. Thomas, and he returned to England, broken in spirit and in fortunes. He returned only to die. On the morning of Oct. 29, 1618, in the sixty-sixth year of his age, he was infamously executed, nominally on the sentence passed on him sixteen years before, but really, there is reason to suppose, in base compliance on James's part with the urgencies of the king of Spain, who resented his persistent hostility.

Raleigh was a man of noble presence, of versatile and commanding genius, unquestionably one of the most splendid figures in a time unusually prolific of all splendid developments of humanity. In the art and finesse of the courtier, the politic wisdom of the statesman, and the skillful daring of the warrior, he was almost alike pre-eminent. The moral elevation of the man shone out eminently in the darkness which beset his later fortunes; and the calm and manly dignity with which he fronted adverse fate conciliated even those whom his haughtiness in prosperity had offended. Raleigh's "Life" has been written by Oldys, Cayley (1806), P. F. Tytler (1833); Edwards (1868), St. John (1868); his poems were published by sir E. Brydges (1814); his *Miscellaneous Writings*, by Dr. Birch (1751), and his *Complete Works*, at Oxford (8 vols. 1829).

RÂLE, or RASLES, SEBASTIEN, 1658–1724; b. France; became a Jesuit and teacher of Greek at Nismes; went to Canada as a missionary in 1689; was stationed at the Abennaki mission of St. Francis, near the falls of Chaudière, afterward among the Illinois Indians, and in 1695 at Norridgewock on the Kennebec river, Me. He learned the Abenaki language, was successful in converting the Indians, built a church, and had so much influence that the English, believing him to be the cause of the Indian forays upon their settlements, set a price upon his head. In 1705 a party attacked and burned the church; in 1722 another party pillaged his cabin, and burnt the church, which had been rebuilt, but he escaped to the woods; in 1724 another party surprised the town, killed several Indians, and shot Râle. Among the papers which were carried off when he fled was his dictionary of the Abenaki language, which is preserved in the library of Harvard college, and has been printed in the memoirs of the academy of arts and sciences.

RALLENTAN'DO (Ital. becoming slower), a musical term, abbreviated *rallent.*, or *rall.*, indicating a gradual relaxing or diminution of time.

RAL'LIDÆ, a family of birds of the order *grallæ*, characterized by a long bill, which is more or less curved at the tip and compressed at the sides, the nostrils in a membranous groove, the wings of moderate length, the tail short, the legs and toes long and slender, the hind-toe placed on a level with the others. To this family belong rails, crakes, gallinules, coots, etc. The toes of some, as coots, are margined with a lobed membrane; but these are by some ornithologists separated from this family (see COOT). Even those rallidæ of which the toes have no marginal membrane, are fitted, by the length of their toes, for walking on mud or oose. Many of them swim and dive well. Most of them are aquatic, or frequent either fresh-water or salt marshes; but some, as the crakes, are found in dry situations.

RALLS, a co. in n.e. Missouri, bounded on the e. by the Mississippi river, which separates it from Illinois; crossed by the Missouri, Kansas and Texas railroad; about 500 sq.m.; pop. '80, 11,838—11,452 of American birth. The surface is prairie or woodland. The soil is fertile. The principal productions are corn, wheat, and cattle. Co. seat, New London.

RÂMA is, in Hindu mythology, the name common to three incarnations of Vishn'u, of Paras urâma, Râmachandra, and Balarâma. See VISHN'U.

RA'MADAN, the ninth month in the Mohammedan year. In it Mohammed received his first revelation, and every believer is therefore enjoined to keep a strict fast throughout its entire course, from the dawn—when a white thread can be distinguished from a black thread—to sunset. Eating, drinking, smoking, bathing, smelling perfumes, and other bodily enjoyments, even swallowing one's spittle, are strictly prohibited during that period. Even when obliged to take medicine, the Moslem must make some kind of amends for it, such as spending a certain sum of money upon the poor. During the night, however, the most necessary wants may be satisfied—a permission which, practically, is interpreted by a profuse indulgence of all sorts of enjoyments. The fast of Ramadan, now much less observed than in former times, is sometimes a very severe affliction upon the orthodox, particularly when the month—the year being lunar—happens to fall in the long and hot days of midsummer. The sick, travelers, and soldiers in time of war are temporarily released from this duty; but they have to fast an equal number of days at a subsequent period, when this impediment is removed. Nurses, pregnant women, and those to whom it might prove really injurious, are expressly exempt from fasting. We may add, that according to some traditions (Al-Beidâwi), not only Mohammed, but also Abraham, Moses, and Jesus received their respective revelations during this month. The principal passages treating of the fast of Ramadan are found in the second Surah of the Koran, called "The Cow."

RÂMÂYAN'A is the name of one of the two great epic poems of ancient India (for the other, see the article MAHÂBHÂRATA). Its subject-matter is the history of Râma, one of the incarnations of Vishn'u (q.v., and see RÂMA), and its reputed author is *Valmîki*, who is said to have taught his poem to the two sons of Râma, the hero of the history; and, according to this legend, would have been a contemporary of Râma himself. But though this latter account is open to much doubt, it seems certain that Valmîki—unlike Vyâsa (q.v.), the supposed compiler of the *Mahâbhârata*—was a real personage; and, moreover, that the Râmâyana was the work of one single poet—not, like the *Mahâbhârata*, the creation of various epochs and different minds. As a poetical composition the Râmâyana is therefore far superior to the *Mahâbhârata;* and it may be called the best great poem of ancient India, fairly claiming a rank in the literature of the world equal to that of the epic poetry of Homer. Whereas the character of the *Mahâbhârata* is cyclopædical, its main subject-matter overgrown by episodes of the most diversified nature, its diction differing in merit, both from a poetical and grammatical point of view, according to the ages that worked at its completion—the Râmâyana has but one object in view, the history of Râma. Its episodes are rare, and restricted to the early portion of the work, and its poetical diction betrays throughout the same finish and the same poetical genius. Nor can there be any reasonable doubt as to the relative ages of both poems, provided that we look upon the *Mahâbhârata* in the form in which it is preserved, as a whole. Whether we apply as a test the aspect of the religious life, or the geographical and other knowledge displayed in the one and the other work, the Râmâyana appears as the older of the two. Since it is the chief source whence our information of the Râma incarnation of Vishn'u is derived, its contents may be gathered from that portion of the article VISHN'U which relates to *Râmachandra.* The Râmâyana contains (professedly) 24,000 epic verses, or *S'lokas*, in seven books, or *Kân'd'as*, called the *Bâla-*, *Ayodhyâ-*, *Aran'ya-*, *Kishkindhâ-*, *Sundara-*, *Yuddha-* (or *Lankâ-*), and *Uttara-Kân'd'a.* The text which has come down to us exhibits, in different sets of manuscripts, such considerable discrepancies, that it becomes necessary to speak of two recensions in which it now exists. This remarkable fact was first made known by A. W. von Schlegel, who, in Europe, was the first who attempted a critical edition of this poem; it is now fully corroborated by a comparison that may be made between the printed editions of both texts. The one is more concise in its diction, and has less tendency than the other to that kind of descriptive enlargement of facts and sentiments which characterizes the latter poetry of India; it often also exhibits grammatical forms and peculiarities of an archaic stamp, where the other studiously avoids that which must have appeared to its editors in the light of a grammatical difficulty. In short, there can be little doubt that the former is the older and more genuine, and the latter the more recent, and, in some respect, more spurious text. A complete edition of the older text, with two commentaries, was published at Madras in 1856 (in the Telugu characters, vol. i.-iii.); another edition of the same text, with a short commentary, appeared at Calcutta in two vols. (1860), and a more careful and elegant one at Bombay (1861). Of the later edition, signor Gaspare Gorresio has edited the first six books (vol. i.-v., Paris, 1843-50) without a commentary, but with an Italian, somewhat free, translation in poetical prose (vol. vi.-x., Paris, 1847-58). Former attempts at an edition and translation of the Râmâyana remained unfortunately incomplete. The earliest was that made by William Carey and Joshua Marshman, who edited the first two books, and added to the text a prose translation in English and explanatory notes (vol. i.-iii., Serampore, 1806-10; and vol. i., containing the first book, Dunstable, 1808). Another edition, of an eclectic nature, is that by A. W. von Schlegel; it contains the first two books of the text, and an excellent Latin translation of the first book and 20 chapters of the second (vol. i., parts 1 and 2, and vol. ii., part 1, Bonn, 1846). Various episodes from the Râmâyana, it may also be added, have at various times occupied sundry editors and translators.

RAMBLA, a market-town of Spain, in the modern province of Cordova, and 23 m. s. of the city of that name, stands on a hill in a district which produces abundantly grain, wine, and oil. Some manufactures of coarse pottery, especially of porous water-coolers, are carried on. Pop. 9,000.

RAMBOUILLET, CATHERINE, Marquise de, one of the most accomplished and illustrious women of the 17th c., was b. at Rome, of Italian parents, in 1588, and received a refined education under the superintendence of her mother, the marchese di Pisani. At the age of 12 she was betrothed to a French nobleman, Charles d'Angennes, son of the marquis de Rambouillet, who succeeded to the family estates and title on the death of his father in 1611. When the youthful marquise first appeared in the assemblies at the Louvre, she was shocked by the gross corruption of morals and manners that prevailed among the mob of courtiers, and almost immediately conceived the idea of forming a select circle for herself, which should meet at her own house—the famous hôtel de Rambouillet. Mme. de Rambouillet was admirably fitted for presiding at the reunions which have made her name famous in the literary history of France. Handsome and gracious, but free from coquetry and all personal pretensions, her affability, generosity, and steadfast attachment to her friends made her an object almost of worship to those who enjoyed her society. The writers of that epoch are unanimous in the expression of their homage. The characteristic feature of the Rambouillet circle was the intercourse, on terms of equality, of the aristocracy of rank, and the aristocracy of genius. *There*, for the first time, do we meet with a generous and adequate recognition of the dignity of letters. For fifty years the *salons* of the marquise were hospitably open to the wits, critics, scholars, and poets of Paris, beginning with Malherbe and Racan, followed by that distinguished circle of *beaux esprits* who contributed so much to the formation of the French language and taste—Costar, Sarrazin, Conrart, Patru, Balzac, Segrais, Godeau, Voiture, and Corneille; and closing with the generation who filled up the interregnum from Corneille to Molière, Scarron, Saint-Evremond, Benserade, the duc de La Rochefoucauld, etc. Many of the literary *débuts* of celebrated geniuses were made at the hôtel de Rambouillet. Here Corneille read his first piece, *Mélite*, and Armand du Plessis, afterward cardinal Richelieu, sustained a *Thèse d'Amour*, and Boileau preached one of his earliest sermons. But the hôtel was almost as much renowned for the brilliant and accomplished women who frequented it, as for its crowd of professional *littérateurs.* The names of mademoiselle de Scudéry, of mademoiselle Coligny—afterward comtesse de la Suze—and of the marquise de Sablé, who inspired the *Maximes* of La Rochefoucauld, are among the most distinguished of their time and country; but above them all, as conspicuous by her splendid beauty as by her faultless grace of manner, the center and idol of both sexes, shone the sister of the great Condé, and the heroine of the Fronde—the duchesse de Longueville. The combined influence of so many different sorts of *esprit* exercised a profound and lasting influence on the literature and society of the 17th c., and is considered—rightly, as we think—to have developed quite a new art—that of lively, polished conversation, in which France has ever since taken the lead, and has thus placed itself socially in the front of European civilization. It has been customary to say that the *Précieuses Ridicules* of Molière was aimed at the foibles of the Rambouillet coterie. But this notion has been shown to be entirely groundless. The *Précieuses Ridicules* was actually first performed at the hôtel, and Molière, in the preface to his *Femmes Savantes*, protests against the supposition that he meant to reflect on a circle which he affirmed had every claim to respect. It appears from investigation, that grotesque imitations of the manners and style of the hôtel had, in the course of years, become prevalent both in Paris and the provinces, and that it was these, and not their charming prototype, which were exposed to the satire of Molière. Mme. de Rambouillet died at Paris, Dec. 2, 1665.—See Röderer's *Mémoire pour servir à l'Histoire de la Société polie en France pendant le dix-septième Siècle;* and Victor Cousin's *Jeunesse de Mde. de Longueville, Mde. de Sablé, etc.*

RAMEAU, Jean Philippe, an eminent French musician, b. at Dijon in 1683, and son of the organist of the Sainte Chapelle there. He showed a genius for music almost from infancy, and with the view of devoting himself to it as a profession, set out for Italy at the age of 18, but proceeded no further than Milan. After traveling through France, and acquiring a considerable reputation as a performer on the organ, he was appointed organist of the cathedral of Clermont, in Auvergne, and wrote while there his *Traité de l'Harmonie*, a work of some note in musical literature, which was published in Paris in 1722. Removing to Paris, he became organist of Sainte Croix de la Bretonnerie, and published various other treatises connected with the theory of music. In 1733, at the mature age of 50, he produced his first opera, *Hippolyte et Aricie*, the drama of which was written by the abbé Pellegrin. It created a great sensation, and Rameau was forthwith elevated to the position of a rival to Lulli as an opera composer, musicians being divided in their partisanship of the two artists. Rameau's best opera was *Castor et Pollux*, produced at the académie royale de musique in 1737; it contains one chorus which has hardly been surpassed in the whole range of theatrical music. Between 1733–60 he composed 21 operas and ballets, as well as numerous harpsichord pieces. His works on harmony acquired for him a deservedly high reputation as a musical theorist; he has been called the Newton of musical science. Louis XV. created for him the office of cabinet composer, granted him letters of nobility, and named him a chevalier de St. Michel. Rameau died in 1764.

RAMESSES, Rameses, or Ramses, the name of several Egyptian monarchs, some of whom were known to the Greek and Roman writers and the chronologists; the name signifies "born of the sun" or the "nascent sun." The Rameses family is supposed to have been of Theban origin, and to have been descended from one of the later queens of the 18th dynasty. The exploits of Rameses are confounded by the Greek and Roman authors with those of Sesostris (see Sesostris), and mingled in the legend of Armais, the Danaus of the Greeks. Rameses is said to have had a great army and navy, and at the head of a force of 700,000 men to have conquered Ethiopia, Libya, Persia, and other eastern nations. Before leaving his kingdom for these distant expeditions, he is said to have appointed his brother Armais or Danaus regent of the kingdom, charging him neither to assume the diadem, nor interfere with the royal harem. Rameses then proceeded to conquer Cyprus, Phœnicia, the Assyrians, and Medes. Armais contravened his orders; and Rameses, informed of this by the high-priest, suddenly returned to Pelusium, and resumed the kingdom, expelling his brother, who, fleeing with his daughters, the Danaids, to Argos, established himself in Greece. According to the Roman authors, however, Troy was taken in the reign of Rameses. The walls of the temples of Thebes were said to be covered with inscriptions and scenes recording his conquests and the tributes rendered to him, and these were interpreted to Germanicus by the priests on his visit to Egypt. Such is the account given of a monarch called Rameses by the classical authors. The following are the principal princes and monarchs of this name, found on the monuments of Egypt. 1. A prince or king represented with the royal families of the 18th dynasty in a sepulcher at Thebes.—2. Rameses I., chief of the 19th dynasty, who reigned but a short time, and whose name is found on the monuments of Thebes and the Wady Halfa.—3. Rameses II., or great, who mounted the throne at a very early age, conquered the Khita or Hittites, and other confederate nations of central Asia, in his 7th year, and concluded an extraordinary treaty with the Khita in his 21st year. Other nations, European and African, fell under his sway, and his empire extended far south in Nubia, the ancient Ethiopia, which he governed by viceroys. He erected fortresses and temples in foreign lands, and embellished all Egypt with his edifices. He had two wives, twenty-three sons, and seven daughters, and was finally buried in the Biban-El-Meluk. He is the supposed Sesostris, according to most authors. He reigned 68 years.—4. Rameses III., chief of the 20th dynasty, the Rhampsinitus of Herodotus, called Meriamoun, or beloved of Ammon, who defeated the Philistines, the Mashuash, and the Libyans, carrying on important wars from the 5th to the 12th year of his reign; he also made conquests in the 16th, and seems to have reigned 55 more years. He founded the magnificent pile of edifices of Medinat Habu, embellished Luxor, Gurnah, and other parts of Egypt. Some attribute to him the exploits of the Rameses of the Greek and Roman writers.—5. Rameses IV. reigned a short time, and performed no distinguished actions.—6. Rameses V., of whom inscriptions are found at Silsilis.—7. Rameses VI., whose tomb at the Biban-El-Meluk contains some astronomical records from which the date of his reign has been calculated at 1240 B.C.—8-12. Rameses VII., VIII., IX., X., and XI., undistinguished monarchs.—13. Rameses XII., who reigned above 33 years, in whose reign the statue of the god Chons was sent from Egypt to the land of the Bakhten, to cure a princess of the royal family of that court, with which Rameses had contracted an alliance.—14. Rameses XIII., an unimportant monarch.

RAMESES is also the name of one of the fortresses or treasure-cities built by the Hebrews during their residence in Egypt. The name of this fortress, all-important for the date of the exodus—placed 1491 B.C. by the old chronologers, and 1314 B.C. by Lepsius—is found in the papyri of the British museum in documents of the age of Meneptah, while Rameses III. is represented at Medinat Habu in one of his campaigns marching out of the Magdol of Rameses. The situation of Rameses has much puzzled geographers and commentators, and it has been supposed to be Abaris, Baal-Zephon, Heroonpolis, Pelusium, and Abu-Kescheh. Notwithstanding the opposition to dating fort Rameses in the period of the 19th dynasty, it is now generally admitted to have been constructed at that period. In fact no fort was ever named by the appellation of a prince, it being the prerogative of the monarch to have the fortresses named after him. Nor is it possible to suppose the name Rameses changed for another older name in the Mosaic writing, without impugning the text; and the evident solution of the difficulty is, that the exodus of the Hebrews took place under a king Rameses, at whatever chronological period his reign may have happened.—Exodus i. 11; Lepsius, *Einleit.;* Chabas, *Mélanges;* Brugsch, *Histoire d'Egypte.*

RAMIE, an East Indian name, often used, for the Bœhmeria (q.v.) Nivea.

RAMILLIES, an inconsiderable village of Brabant, Belgium, 13 m. n. of Namur, and 28 m. s.e. of Brussels, is memorable as the place near which one of the most important battles of the war of the Spanish succession was fought, May 23, 1706. In this conflict, the French forces were under the command of marshal Villeroy and the elector of Bavaria, while Marlborough led the troops of the allies. Villeroy, after a battle of three hours and a half, was defeated, with the loss of almost all his cannon, the whole of his baggage, and 13,000 men in killed and wounded. The great result of this victory was that the French were compelled to give up the whole of the Spanish Netherlands.

RAM'MELSBERG, one of the Harz mountains, rather less than 2,200 ft. high, and celebrated for its mines, which yield gold, silver, lead, zinc, copper, sulphur, vitriol, and alum. They have been worked, according to tradition, from the year 968; and their possession was for ages a source of strife between the inhabitants of Goslar (q.v.) and the dukes of Brunswick.

RAMISSERAM, or RAMESWAR, a small sandy uncultivated island, about 11 m. long and 6 m. broad, in the gulf of Manar, between the peninsula of Hindustan and Ceylon. It is about a mile from the coast, and separated from the mainland by Pamban pass. A line of black rocks stretches across the gulf from Ramisseram to Ceylon, known by the name of Adam's bridge. The island is low, and much of it is covered with swamps. It is well watered, and there is a fresh-water lake 3 m. in circuit. On one side is the town of Ramisseram, containing 1000 houses and a famous temple built of huge blocks of granite. It is regarded as a very holy place, and celebrated throughout India as a place of pilgrimage for Hindus, the number annually visiting it being estimated at 30,000. Pamban is the port of the island.

RAMMOHUN ROY, a celebrated Hindu rajah, was born at Bordnan, in the province of Bengal, between 1774 and 1780. In a sketch of his own life, written in 1832, he states that his ancestors were Brahmans of a high order. At home he acquired the usual elements of native education, with some knowledge of the Persian language. At Patna, and afterward at Benares, he studied Sanskrit, and the works written in it, which contain the spirit of Hindu law, literature, and religion. At a very early age he began to compare the evidence for and against the various religious doctrines held by those around him; nor did he except from this investigation those doctrines in belief of which he himself had been brought up. Finding them all repugnant to his vigorous understanding, he boldly acknowledged this fact both to himself and to the world. The result was a quarrel with his father, his family, and his community. He appears, indeed, to have succeeded in converting the understanding of his mother; but it, in its turn, was overcome by her sentiment. "You are right," she said to him, when she was about to set out on a pilgrimage to Juggernaut; "but I am a woman, and cannot give up observances which are a comfort to me." Rammohun Roy spent two or three years of his youth in Tibet, where he excited general anger by denying that the Lama was the creator and preserver of the world. For a long time he had a strong, and perhaps not unfounded, dislike to the English; but becoming convinced that their sway was, on the whole, beneficial to India, his views changed, and he applied himself to the study of the English language. For five years he held the office of revenue collector in the district of Rungpoor. In 1803 his father died, but left him no part of his estate. In 1811, however, by the death of his brother, he succeeded to affluence. "After my father's death," he says, "I opposed the advocates of idolatry with still greater boldness." He published various works in Persian, Arabic, and Sanskrit; the object of the whole being the uprooting of idolatry. He also issued in English an abridgment of a work called the *Vedant*, giving a digest of the Vedas, the ancient sacred books of the Hindus. Becoming more convinced, as he grew older, of the excellence of the moral theories of Christianity, in 1820 he published *The Precepts of Jesus, the Guide to Peace and Happiness.* It appears from this work, that while he believed in the morality preached by Christ, he did not believe in the divinity of the preacher. He rejected the miracles also, and other portions of the gospels held to be fundamental in the various churches of Christendom. The book, therefore, as was to have been expected, met with severe ecclesiastical censure, the grounds of censure being various and conflicting. In April, 1831, the rajah visited England. The great question of parliamentary reform was then agitating the country. Of the reform bill he wrote, that it "would, in its consequences, promote the welfare of England and her dependencies; nay, of the whole world." His society was universally courted in England. He was oppressed with invitations to attend social parties, and political and ecclesiastical meetings. His anxiety to see everything and to please all led him to overtask himself to such an extent that his health, long failing, at last quite broke down. He died at Bristol, Sept. 27, 1833. The adverse circumstances of his birth were such as might easily have enslaved even his powerful understanding, or still more easily, might have perverted it to selfish ends; but he won his high position by an inflexible honesty of purpose and energy of will.—See Sketch of his Life, written by himself, in the *Athenæum*, No. 310, Oct. 5, 1833; also *Chambers's Edinburgh Journal*, Aug. 2, 1834.

RAMNAD, a t. of British India, in the district of Madura, presidency of Madras, 125 m. n.e. from cape Comorin, and about 5 or 6 m. from the shore of Palk's bay. In the center of the fort is the palace or residence of the zemindar, one of the greatest of his class in the s. of India, his extensive possessions containing more than 2,000 villages, and nearly 300,000 inhabitants. Pop. about 18,000, of whom 6,000 dwell within the fort.

RAMNEGHAR, or RAMNUGGUR (Town of God), formerly called Rasulnuggur, a walled town of the Punjab, beautifully situated in an extensive plain on the left bank of the Chenab, 65 m. n.n.w. of Lahore. There is here a ferry across the river, which is 300 yards wide, and 9 ft. deep; but 2 m. lower there is a ford, at which the depth is only 3 ft., when the water is at its lowest. The town is surrounded by walls, and contains 8 well-supplied bazaars. Pop. stated at 11,000.

RAMNEGHAR, or RAMNUGGUR, a t. of British India, n.w. provinces, in the district of Benares, and 4 m. s. of the city of that name, on the right bank of the Ganges. Its fort, the residence of the rajah, rises from the banks of the sacred stream by a number of fine ghats or flights of stairs. Pop. '72, 11,953.

RAMOTH-GILEAD, called also Ramoth-Mizpeh, a t. in Gilead, one of the chief cities of Gad, e. of the Jordan. It was a strong fortress, and the key to an important district. It was the last of the places which the Syrians conquered and held. Ahab was killed in attempting to recover it, and his son Joram wounded fourteen years after. Eusebius places Ramoth-Gilead on the river Jabbok, where are the ruins of a town called Jelaad, a different form of the Hebrew Gilead.

RAMP, a sudden upward curve in the hand-rail of a stair.

RAMP, in fortification, is a gradual slope by which approach is had from the level of the town or interior area to the terreplein or general level of the fortifications behind the parapet.

RAMPANT (Fr. literally, "raging"), in heraldry, an epithet applied to a lion or other beast of prey when placed erect on the two hind-legs, with only one of the fore-legs elevated, the head being seen in profile. When the face is turned towards the spectator, the attitude is called *rampant gardant*, and when the head is turned backward, *rampant regardant.* A lion *counter-rampant* is one rampant toward the sinister, instead of toward the dexter, the usual attitude. Two lions rampant contrariwise in saltier are sometimes also said to be counter-rampant.

RAMPART, forms the substratum of every permanent fortification. See FORTIFICATION. It constitutes the enceinte, and is constructed immediately within the main ditch by throwing up the soil excavated from it. On the front of the rampart the parapet is raised, and width should be left behind it to allow of guns, wagons, and troops passing freely on the top of the rampart. The height of the rampart is dependent on the relief (height) of the buildings to be defended, and on the positions in the neighborhood which an enemy might assume.

RAMPHASTIDÆ. See TOUCAN.

RAMPION, *Campanula rapunculus* (see CAMPANULA), a perennial plant, a native of Europe, rare in England, with a stem about 2 ft. high, and a panicle of very pretty pale-blue bell-shaped flowers. The radical leaves are ovato-lanceolate and waved. The root is white and spindle-shaped, and was formerly much used for the table, under the name of *rampion* or *ramps.* The plant is now little cultivated in Britain, but is still commonly cultivated in France for the sake of its roots, which are used either boiled or as a salad, and of its young leaves, which are also used as a salad.

RAMSAY, ALLAN, an eminent Scottish poet, was born in the parish of Crawford, Lanarkshire, Oct. 15, 1686. His father was manager of lord Hopetoun's mines at Leadhills, and his mother, Alice Bower, was the daughter of a Derbyshire miner. To this maternal descent we may perhaps trace Allan's peculiar frankness and gayety of temperament. In his 15th year (by which time he had lost both of his parents) he was put apprentice to a wig-maker in Edinburgh. He had received the ordinary education of a parish school, and could read Horace, as he says, "faintly in the original." Up to his 30th year, he continued to follow the occupation of a wig-maker; and by this time he had become known as a poet, having issued several short humorous pieces, printed as broad-sides, and sold for a penny each. He had also written (1716–18) two additional cantos to the old Scots poem of *Christ's Kirk on the Green*, attributed to James I. These two cantos gave such genuine pictures of rustic life, and presented such felicitous scenes of broad humor, that it was obvious their author was destined to become the restorer of Scottish poetry. Patronized by the highest and worthiest of the land, Ramsay now abandoned wig-making, and commenced business as a bookseller. His shop was "opposite Niddry's Wynd," and he placed a sign of Mercury over his door. Subsequently, as his success increased, he removed to the Luckenbooths, and deposing Mercury, set up heads of Drummond and Ben Jonson. He also added to his business a circulating library, the first established in Scotland. From 1718, when he opened shop as a bookseller, down to 1755, when he retired to a villa of his own erection, Ramsay's career, worldly and literary, was eminently prosperous. He was careful and industrious, determined, he said, to show the world that *poortith*, or poverty, was not "the poet's lot;" and though he was always courting patronage, he never selected a fool for his patron, nor did his pride and vanity as a poet ever withdraw him from business. The following are his principal works: *Tartana, or the Plaid*, 1721; a collected edition of his *Poems*, published by subscription in 1721, by which it is said the poet realized 400 guineas; *Fables and Tales*, 1722; *Fair Assembly*, 1723; *Health, a Poem*, 1724; *The Tea-table Miscellany*, a collection of the most choice songs, Scottish and English, 1724, to which a second volume was published in 1725, a third in 1727, and a fourth in 1740; *The Evergreen*, "being a collection of Scots poems wrote by the ingenious before 1600," published in 1724; *The Gentle Shepherd, a Pastoral Comedy*, 1725, to which songs were added in 1728; a second collection of *Poems* published by subscription, 1728; *Thirty Fables*, 1730. Of most of these publications, numerous editions were called for, no less than nine of the *Tea-table Miscellany* being issued in nine years. One brief cloud overcast the poet's successful career. He entered into a speculation for the encouragement of the drama, and built a theater in Edinburgh, which was almost immediately shut up by the magistrates, in virtue of the act passed in 1737 prohibiting all dramatic exhibitions without special license. This affair was a serious loss to the poet, and subjected him to the annoyance of attacks from poetasters and morose religionists, such as "A Looking-glass for Allan Ramsay," "The Dying Words of Allan Ramsay," "The Flight of Religious Piety from Scotland upon the Account of Ramsay's Lewd Books and the Hell-bred Playhouse Comedians," etc. Allan bore all with Horatian philosophy and indifference; but he addressed a poetical epistle to his friend, Duncan Forbes of Culloden, then lord-advocate, claiming compensation for his losses, or, at least, that he might be "edged into some canny post." This request does not seem to have been complied with, but Allan had amassed a decent competency. The last two or three years of his life were spent in cheerful retirement in the quaint but picturesque house he had built on the north side of the Castle hill, and there he died on Jan. 7, 1758. He had the gratification of seeing his only surviving son, ALLAN RAMSAY (born in 1713, died in 1784), fast rising into distinction as a portrait-painter, and esteemed by the most eminent men of his day as an accomplished scholar and gentleman. This second Allan Ramsay had been carefully educated by his father, and sent to Rome to study art. On his return, being introduced to the prince of Wales, afterward George III., he rapidly rose into favor, and in 1767 was appointed principal painter to the king.

The *Gentle Shepherd* of Ramsay is his greatest work, and, indeed, is esteemed as the best pastoral in any language. Its characters are realities, not shadowy Corydons or Phyllises, maundering over crooks, or sleeping to the murmur of bees. It contains faithful transcripts of actual life and feeling, such as the poet had witnessed in his youth on the banks of the Clyde and Glengonar. The poetry, too, abounds in graphic expression and touches of homely nature and arch humor, that to Scotsmen are irresistible, while the plot is skillfully constructed, and brings out rustic character, customs, and superstitions. Some of Ramsay's tales and fables are amusing, but coarse. His songs also are occasionally defective in respect of simplicity and delicacy, though he has made some exquisite additions to our lyrical poetry. In his Jacobite allegory, *The Vision*, he rises into the higher region of inspiration, apparently imitating, and certainly rivaling Dunbar. As an editor, he has been censured for tampering with the works of the old bards, retouching, adding, or retrenching at his pleasure. But he also rescued many choice productions of the elder muse from neglect, and awakened in Scotland a taste for its native literature. A complete edition of his poems with a biography was published by Chalmers (1800; new edition, with essay by Lord Woodhouslee, 1874). Editions appeared in 1854 and in 1870. A monument to Ramsay was erected in Edinburgh in 1865.

RAMSAY, ANDREW CROMBIE, LL.D., b. Glasgow, Scotland, 1814; educated at Glasgow university. In 1841 he was appointed on the geological survey of Great Britain, and in 1845 became director of the undertaking. In 1848 he was made professor of geology at University college; in 1862 president of the geological society, and in 1872 director-general of the geological survey of the United Kingdom and of the museum of practical geology. He is a member of many scientific and philosophical societies in England and America. He has published many papers on geological subjects, and several books, the chief of which is *Physical Geology and Geography of Great Britain* (1878).

RAMSAY, ANDREW MICHAEL, LL.D., Chevalier de, 1686–1743; b. Scotland; educated at the university of Edinburgh; devoting himself chiefly to mathematics and theology. Being skeptical as to the Protestant tenets he visited Fénelon at Cambray and became a convert to the Roman Catholic faith. His earlier writings obtained for him the position of tutor to the duke of Château Thierry and to the prince of Turenne. In 1724 the Pretender invited him to Rome and intrusted to him the education of his children. After his return to France he was appointed intendant to the prince of Turenne. His writings are remarkable for their purity of style and perfect knowledge of the French language. Of his works in French the best are *Voyages de Cyrus; L'Histoire de la Vie de François de Salignac de la Motte Fénelon; Discours sur le Poème Epique; Essai Philosophique sur le Gouvernment Civil; Histoire de Turenne.*

RAMSAY, DAVID, 1749–1815; b. Penn.; settled as a physician in Charleston, S. C., 1773. He served in the state legislature 1776–83, was a surgeon in the continental army, and a member of the council of safety. He was taken prisoner at the capture of Charleston in 1780, and confined for 11 months in St. Augustine. He was a member of congress 1782–86, and its president for one year. He was shot by a lunatic against whom he had testified. Among his works are a *History of the Revolution in South Carolina*, 1785; *History of the American Revolution;* and *Universal History Americanized*, 1816-19.

RAMSAY, EDWARD BANNERMAN, LL.D., 1793–1872; b. Scotland; graduated at St. John's college, Cambridge, in 1815; ordained in the church of England; was curate in Somersetshire for seven years; in 1830 was minister of St. John's church, Edinburgh; in 1841 dean of the Reformed Episcopal church of Scotland. Among his productions, besides lectures and sermons, are *Reminiscences of Scottish Life and Character; Manual of Catechism; Diversities of Christian Character; The Canon Law of the Episcopal Church of Scotland as understood in* 1860; *Christian Responsibility; Pulpit Table Talk.*

RAMSAY, NATHANIEL, b. Md.; brother of David the historian; educated at the college of New Jersey, where he graduated in 1767. He joined the revolutionary forces at the outbreak of war, became a col., and distinguished himself at the battle of Monmouth, where his regiment saved the American forces from a complete rout. At the siege of Charleston he was made a prisoner. He was a delegate from Maryland to the congress of 1785.

RAMSDEN, JESSE, a celebrated instrument-maker, was b. at Salterhebble, near Halifax, Yorkshire, in 1735. He received a good education, and, after being engaged as a cloth-worker, and become (1762) a working engraver and divider in London, and having married Dollond's (q.v.) daughter, received, as her dowry, a share in his father-in-law's patent for achromatic telescopes, The sextants of his time were very imperfect, being untrustworthy within 5′ of a degree, and Ramsden succeeded in reducing the possible error to within 30″. His skill thus shown, and the cheapness of his instruments (two-thirds of the price charged by other makers), soon created such a demand as tasked his utmost energy to meet. To increase the amount and improve the quality of the work done by his men, he introduced the principle of the division of labor, besides inventing a dividing-machine, which could graduate instruments much more rapidly and accurately than could be done by hand. For this invention he received from the board of longitude a premium of £615. He constructed the theodolite used by gen. Roy (q.v.), and also telescopes for the observatories of Blenheim, Mannheim, Dublin, Paris, and Gotha, and mural quadrants for those of Padua and Vilna, the accuracy of all of which was a matter of admiration and delight among astronomers. He was one of those who strongly recommended the introduction of the mural circle in place of the quadrant (q.v.), and he constructed two of the former instruments for the observatories of Palermo and Dublin. The minor scientific instruments invented or improved by him are also numerous. He died at Brighton, Nov. 5, 1800, leaving a moderate fortune, a large portion of which was, in accordance with the terms of his will, divided among his workmen. Ramsden was a member of the royal society, a fellow of the imperial academy of St. Petersburg, and the possessor of a Copley medal (the gift of the royal society).

RAMSEY, an unorganized co. in n.e. Dakota; about 1800 sq.miles.

RAMSEY, a co. in e. Minnesota, bounded on the s. by the Mississippi river; on the St. Paul and Manitoba, the Chicago, Milwaukee and St. Paul, the St. Paul and Duluth, the St. Paul, Stillwater and Taylor's Falls, the Chicago, St. Paul and Minneapolis, and the St. Paul and Sioux City railroads; about 155 sq.m.; pop. '80, 45,915—29,831 of American birth. The surface is prairie or woodland, and contains many lakes. The soil is fertile. The principal productions are corn, wheat, hay, and oats. Co. seat, St. Paul.

RAMSEY, a t. in the isle of Man, lying 16 m. n. of Douglas, and which, from the beauty of its situation and salubrity of its climate, is rapidly becoming a favorite resort of tourists and pleasure seekers. It stands on the margin of a spacious bay, and has a background of lofty and well-wooded hills. The anchorage in the bay is good, and the waters abound in mackerel, herrings, salmon, and other fish. An extensive ship-building yard has recently been opened here, which gives occupation to about 300 men. A public promenade and inclosure on the foreshore have been made, and extensive harbor-works erected. Steam-packets run from Ramsey to Liverpool and to Whitehaven regularly all the year. Pop. '71, 3,934.

RAMSGATE (*Rium's* Gate; *Rium* is the British name of Thanet), a sea-port, market t., and favorite watering-place in the county of Kent, in the s.e. of the isle of Thanet, 97 m. e.s.e. of London by railway. Anciently it was a small fishing-village; but it began to increase in importance about the beginning of the 18th c., when a number of its inhabitants opened up a successful trade with "Russia and the east country." The recently built portion of the town consists of well-arranged streets, crescents, and terraces; and the older part is situated in a natural depression or cutting in the chalk-coast, opening out toward the sea, and called in this district a "gate" or "stair." Ramsgate, as a watering-place, is slightly more aristocratic than Margate (q.v.); and during the season, which lasts from the middle of summer to the end of autumn, the charges are very high. At the height of the season the population of Ramsgate is increased to above 20,000. The climate is much more bracing than that of the southern coast, and exercises a salutary influence in cases of scorbutic disorder. The harbor of Ramsgate—40 acres in extent, and inclosed on the e. by a splendid pier 3,000 ft. in length, and on the w. by another pier 1500 ft. long—serves as a harbor of refuge for the downs. About 1¼ m. w. of Ramsgate is Osengall hill, on which a number of Saxon and several Roman graves have been recently discovered, and a large number of most interesting relics, as spear-heads, coins, ornaments in silver, etc., armor, glass and amber beads, etc., found. (See Wright's *Wanderings of an Antiquary*). Ship-building and rope-making are here carried on, and coal is imported. In 1875 337 vessels, of 29,550 tons, entered the port, and 104, of 6,386 tons, cleared. Pop. '71, 14,640.

RAMSHORNS, in fortification, are semicircular works of low profile in the ditch, which they sweep, being themselves commanded by the main works. They were invented by M. Belidor, a great French engineer, and, when used, take the place of *tenailles* (q.v.).

RAMSKIN, a species of cake, which consists of grated cheese of some dry kind, such as parmesan or the white hard English varieties, incorporated with dough as prepared for fine puff-pastry; then rolled out, and cut into shapes, glazed with white of egg, and baked for a quarter of an hour. It is usually eaten hot. This dish is said to have been invented at Croxteth hall, the seat of lord Sefton, whence it is sometimes called "Sefton fancy."

RAM-TIL, *Guizotia oleifera*, a plant of the natural order *compositæ*, suborder *corymbiferæ*, a native of the East Indies and Abyssinia, much esteemed for the bland oil which is obtained from the seeds, and which is employed for the same purposes as olive oil. The ram-til is extensively cultivated in India, chiefly in Mysore, and to some extent also in Abyssinia.

RAMUS (Latinized form of *La Ramée*), PIERRE, an illustrious French "humanist," was the son of a poor laborer, and was born at the village of Cuth, in Vermandois, in 1515. His thirst for knowledge was so great, that twice before he had reached his 12th year he traveled on foot to Paris, with the hope of getting into some school there, but the misery of want twice drove the brave boy home again. In his 12th year, however, he got a situation as servant to a rich scholar at the collége de Navarre; and by devoting the day to his master, obtained the night for study, and made rapid progress. The method of teaching philosophy then prevalent dissatisfied him, and he was gradually led to place a higher value on "reason" than on "authority," contrary to the mental habit of his time. His contempt, indeed, for "authority" blinded him (as is often the case with a young reformer) to what truth "authority" might contain, and when taking his degree of M.A., in his 21st year, he maintained the extravagant thesis that "all that Aristotle had said was false" (*quæcunque ab Aristotele dicta essent, commentitia esse*). It says a great deal for the ability he showed on this occasion, that his judges, although themselves Aristotelians, were compelled to applaud him. Immediately after, Ramus became a teacher in the collége du Mans, and along with two learned friends opened a special class for reading the Greek and Latin authors, designed to combine the study of eloquence with that of philosophy. His audience was large, and his success as a teacher remarkable. He now turned his attention more particularly to the science of logic, which, in his usual adventurous spirit, he undertook to "reform;" and no one acquainted with his system will deny that many of his innovations were both rational and beneficial. His attempts excited much hostility among the Aristotelians, and when his treatise on the subject (*Dialecticæ Partitones*) appeared in 1543 it was fiercely assailed by the doctors of the Sorbonne, who managed to get it suppressed by a royal edict, and even barbarously demanded that its author should be sent to the galleys. But Ramus had (at this time) two powerful friends, cardinals Charles de Bourbon and Charles de Lorraine, who protected him from personal injury, and through whose influence he was, in 1545, appointed principal of the collége de Presles, which he raised from a condition of decay to the most splendid prosperity. In 1551 cardinal Lorraine succeeded in instituting for him a chair of eloquence and philosophy at the collége Royal; and his inaugural address (*Pro Philosophica Disciplina*, Par. 1551) is reckoned a masterpiece of the kind. He devoted the first eight years of his teaching to the first three of the "liberal arts" (grammar, rhetoric, and logic), which he called elementary or exoteric, and published three grammars successively, Greek, Latin, and French. He also mingled largely in the literary and scholastic disputes of the time, and, on account of his bustling activity, came under the satire of Rabelais. But though Ramus had innumerable adversaries, he might have defied them all, so great was his influence at court, had his love of "reformation" not displayed itself in "religion" as well as in logic. In an evil hour (for his own comfort) he embraced Protestantism. He had long been suspected of a leaning that way, and, as we have seen, his intellect was by nature scornfully rebellious toward the *ipse dixit* of "authority;" but he had for years decently conformed to the practices of the Catholic cult, and it was only after cardinal Lorraine, in reply to the conference of Poissy (1561), frankly admitted the abuses of the church and the vices of the clergy, that he ventured formally to abjure the older faith. The outbreak of the religious wars in France plunged him into the dangers of the time, and he finally perished in the fatal massacre of St. Bartholomew, Aug., 1572. It is believed that he was assassinated at the instigation of one of his most violent and persistent enemies, Charpentier, rector of the collége de Presles.

Ramus holds a most honorable place in the list of intellectual reformers. His assault on scholasticism as a *method of thinking* is vigorous, and, on the whole, well directed; his exposure of its puerile and useless subtleties is thorough, and entirely in accordance with later criticism. In his contempt for the illiterate worship of Aristotle, in his admiration of Plato and of the ancient orators and historians, he ranks (though late) with the scholars of the renaissance; but in his assertion of "reason" as the supreme criterion of truth, he must be regarded as the forerunner of Descartes and the modern world. His system of logic, by which perhaps his name is best known, is marked by its lucid definitions, its natural divisions, and its simplification of the rules of the syllogism; but (like every pre-Baconian system) it fails to realize the supreme importance of the inductive method. What strikes one most, however, in Ramus is not so much his particular achievements as his universal intellectual activity. He was the first mathematician of his age in France, and wrote treatises on arithmetic, geometry, and algebra, which were text-books for 100 years; he was among the earliest adherents of the "Copernican" system of astronomy, and in natural philosophy avowed himself an enemy to hypothesis and abstractions; rhetoric, morals, theology, all engaged his pen, and he seldom handled a subject which he did not to some degree elucidate. His followers were a widespread and for long a powerful body of thinkers and teachers. France, England, the Low Countries, Germany, Switzerland, Denmark, and even Spain, had their *Ramists*, as they were called, and they have disappeared chiefly because their tendencies are embraced in the broader and more critical methods of modern scientific inquiry. A list of his writings is given in the *Nouvelle Biographie Universelle*, article "Ramus."—See Waddington's *Ramus, sa Vie, ses Ecrits, et ses Opinions* (Paris, 1855); E. Saisset's *Les Précurseurs de Descartes* (Paris, 1862); and C. Desmaze's *P. Ramus, Professor au Collége de France, sa Vie, ses Ecrits, sa Mort* (Paris, 1864).

RA'NA AND **RA'NIDAE.** See FROG.

RANCÉ, ARMAND JEAN LE BOUTHELIER DE, the well-known founder of the reformed order of La Trappe (see TRAPPISTS), was b. Jan. 9, 1626, at Paris, where he was educated. Having taken his degree in the Sorbonne with great applause, and embraced the ecclesiastical profession, he soon became distinguished as a preacher, and through the favor of cardinal Richelieu obtained more than one valuable benefice. He succeeded, while yet a young man, to a large fortune, and for a time, notwithstanding his clerical character, was carried away by the gayety and dissipation of Parisian life. After a time, however, having forfeited the favor of cardinal Mazarin, and being deeply moved by the death of a lady, the duchess de Montazon, to whom he was much attached, he withdrew from Paris, and after a time resolved to sell all his property, to distribute the proceeds among the poor, and to devote himself exclusively to the practice of piety and penitential works. Finally, he resigned all his preferments (of which, by the abusive practice of the period, he held several simultaneously), with the exception of the abbacy of La Trappe, to which convent he retired in 1662, with the intention of restoring the strict discipline of the order. The history of the reforms which he effected will be found under the head TRAPPIST. He lived in this seclusion for 33 years, during which he published a large number of works, chiefly ascetical. The only remarkable event of his literary life was his controversy with Mabillon, in reply to his *Etudes Monastiques*, on the subject of the studies proper for the monastic life. Rancé's work is in 4to, 1692. In his youth, he had edited *Anacreon*, in one volume, octavo (Paris, 1639), with a dedication to cardinal Richelieu. He died Oct. 27, 1700.

RANCHE'ROS (from the Spanish *rancho*, comradeship) is the name given in Mexico to a mixed breed of Spanish and Indian blood, who inhabit the country, and may almost be said to live in the saddle from their youth, are splendid riders and hunters, and form the bravest part of the Mexican army—its irregular cavalry. The importance of their services was seen in the wars with the United States. The Rancheros are lank in frame, with brown weather-stained faces and muscular limbs, hardy, temperate, and always ready for the boldest enterprises. They practice polygamy.

RANCID'ITY. See OILS AND FATS.

RANDALL, HENRY STEPHENS, LL.D., 1811-76; b. N. Y.; graduated from Union college, 1830; studied law and was admitted to the bar, but never engaged in active practice. He interested himself in agriculture and education, was associate editor of Moore's *Rural New Yorker*, and in 1851 was made secretary of state and superintendent of public instruction of New York. He published pamphlets on sheep-raising, educational papers, and a life of Jefferson (1857).

RANDALL, SAMUEL J., b. Philadelphia, 1828; received an academic education, and engaged in mercantile pursuits. He was for four years a member of the Philadelphia city councils, and in 1858 was elected to the state senate. He was elected a member of the U. S. house of representatives in 1863, and, taking his seat in the 38th congress, has continued in congress from that time forward, and was chosen speaker of the house at the last session of the 44th congress, and again for the 45th congress. At the beginning of the war of the rebellion, he enlisted as a private soldier in the volunteer army, and went to the front with his company; and while serving under col. Geo. H. Thomas was re-elected to congress.

RANDAZ'ZO, a t. of Sicily, in the province of Catania, at the base of mount Etna, and 8 m. n. by w. from its summit, on the Cantara. It crowns the summit of a low cliff of lava, and ascends the slope above, with brown battlemented walls and Norman towers, so mediæval in its whole appearance, that it has been likened to "a town of the middle ages preserved as a curiosity." Randazzo is believed to have been founded by the Lombard adventurers who assisted count Roger in his conquest of Sicily. Pop. '71, 7,945.

RANDERS, a t. in Jutland, chief town of the *Amt* or bailiwick of the same name, is situated on the Guden, at its entrance into the Randers-Fiorde, 20 m. from the mouth of the latter in the Cattegat. Though still fortified, it has much declined from its early *prestige* and importance. Brewing, distilling, and the manufacture of gloves, which are in high repute, and of stockings and cloth, are carried on. Pop. '70, 11,354.

RANDOLPH, a co. in e. Alabama, adjoining Georgia; drained by the Tallapoosa and Little Tallapoosa rivers; about 690 sq.m.; pop. '80, 16,575—3,420 colored. The surface is uneven, and heavily timbered. The soil is fertile. The principal productions are wheat and corn. Co. seat, Wedowee.

RANDOLPH, a co. in n.e. Arkansas, bordering on Missouri; drained by Big Black, Spring, and other rivers; traversed by the Cairo and Fulton railroad; 1000 sq.m.; pop. '80, 11,724—11,633 of American birth, 627 colored. The surface is broken, heavily wooded, and fertile; corn, cotton, pork, and cattle are the staples. Limestone is found. Co. seat, Pocahontas.

RANDOLPH, a co. in s.w. Georgia; drained by Pataula and Ichawaynochaway creeks; traversed by the Southwestern railroad; about 475 sq.m.; pop. '70, 10,561—5,477 colored. The surface is level. The soil is fertile. The principal productions are cotton and corn. Co. seat, Cuthbert.

RANDOLPH, a co. in s.w. Illinois, bounded by Missouri, and on the s.w. by the Mississippi river; drained also by the Kaskaskia river; intersected by the Iron Mountain, Chester and Eastern railroad; 580 sq.m.; pop. '80, 25,691—21,886 of American birth. The surface is hilly, heavily wooded, and fertile; wheat, hay, oats, corn, and pork are the staples. Bituminous coal and limestone are found. Co. seat, Chester.

RANDOLPH, a co. in e. Indiana, bounded by Ohio on the e.; drained by White, Whitewater, and Mississinewa rivers; traversed by the Pittsburg, Cincinnati and St. Louis and other railroads; 480 sq.m.; pop. '80, 26,437—25,898 of American birth. The surface is level, heavily wooded, and fertile; corn, oats, wheat, pork, and cattle are the staples. Co. seat, Winchester.

RANDOLPH, a co. in n. central Missouri; drained by Chariton river and branches of Salt river; traversed by the St. Louis, Kansas City and Northern, and a division of the Missouri, Kansas and Texas railroads; 440 sq.m.; pop. '80, 12,751—12,302 of American birth, 2,814 colored. Surface, a very fertile prairie; oats, corn, sorghum, wool, and butter are staples; tobacco is raised in very large quantities; coal and limestone are found. Co. seat, Winchester.

RANDOLPH, a co. in w. central North Carolina; drained by the Uharee and Deep rivers; about 760 sq.m.; pop. '80, 20,836—3,077 colored. The surface is varied, heavily timbered, and contains gold and quartz. The soil is fertile. Corn, wheat, and live stock are the principal productions. Co. seat, Ashborough.

RANDOLPH, a co. in e. West Virginia, watered by the Cheat river, the Dry, Glade, and Laurel forks of the Cheat, and Tygart's Valley river; intersected by Cheat mountain and other ridges of the Alleghanies; about 1075 sq.m.; pop. '80, 8,102—7,632 of American birth, 111 colored. The surface is uneven and heavily timbered. The soil in the lowlands is fertile. The principal productions are corn, wheat, oats, and hay. Co. seat, Beverley.

RANDOLPH, a t. in e. Massachusetts, incorporated 1793; 15 m. from Boston on the Old Colony railroad; pop. '80, 4,027. It is regularly laid out with many old shade trees; has an elegant town-house, 3 churches, 1 chapel, 1 newspaper, a public library, and library building of Quincy and Randolph granite, given by the heirs of col. Royal Turner. It has a national bank, public schools, and a high-school, supported in the main by a bequest of Amasa Stetson. Its manufactures are important. It has several very large boot and shoe factories and woolen mills.

RANDOLPH, EDMUND, 1753–1813; b. Va.; nephew of Peyton. He sided with the whigs, and was disinherited by his father, a bitter royalist. In 1775 he was a member of Washington's staff, and the next year sat in the Virginia convention in May. He was a member of the continental congress 1779–83, and of the constitutional convention of 1787. He proposed in that body the so-called Virginia plan, but would not sign the new constitution. He was, however, in favor of its adoption in the Virginia convention called to act upon it. He was governor of Virginia in 1788, attorney-gen. 1788–90, and in 1794 became Jefferson's successor in the state department. He resigned in Aug., 1795, being suspected of an intrigue with the French minister.

RANDOLPH, PEYTON, 1723–75; b. Va.; second son of sir John Randolph. After graduating at William and Mary college, he completed his education in England, and on his return was made king's attorney gen. for the colony; in 1748 was a member of the house of burgesses, and was chairman of a committee to revise the Virginia code of laws. In 1764 he drew up the address from the burgesses to the king, protesting against the passage of the stamp-act, and was conspicuous in bringing about the first Philadelphia congress, and in all the movements which brought on the revolution. In 1774 he was president of the first colonial congress, also a delegate in the following year; was re-elected president, again served as speaker of the house of burgesses of Virginia, and shortly after his return to congress died suddenly of apoplexy.

RANDOLPH, JOHN, OF ROANOKE, an American statesman, was born at Cawsons in Chesterfield co., Va., June 2, 1773. He was descended from an ancient and wealthy family, and boasted that the Indian princess Pocahontas was one of his ancestors. Educated at Princeton and Columbia colleges, he embraced the profession of the law, and in 1799 was elected to congress, where he became distinguished for his eloquence, wit, sarcasm, invective, and eccentricity, and for 30 years was more talked and written of than any American politician. Tall and meager, peculiar in dress and manners, he was described as a strange mixture of the aristocrat and the Jacobin. He was the democratic leader of the house of representatives, but quarreled with Jefferson, and opposed the war of 1812, and the Missouri compromise, and stigmatized the northern members who voted for it as "doughfaces." In 1822 and 1824 he visited England, where his eccentricities attracted much notice. In 1825 he was chosen United States senator from Virginia, and in 1830 appointed minister to Russia. By his will, he manumitted 318 slaves, and provided for their maintenance in a free state. He died in Philadelphia, June 24, 1833. See *Life of John Randolph*, by Garland (2 vols., New York, 1850).

RANELAGH, a village forming part of the suburb of Dublin, is situated 2 m. s. from the center of the city. It consists of one principal street with a square, but is surrounded by villas. Pop. '71, 3,209.

RANGE, in gunnery, is the distance between a point on the ground vertically below the muzzle of the piece and the point on the same level at which the projectile touches in its descent. The point-blank range is when the piece is fired in a horizontal position; the range then increases with the elevation; and if the air opposed no resistance, the greatest range would be attained with the piece elevated at an angle of 45°; but in practice this angle is found to be, on an average, a little over 30°. As the resistance of the atmosphere increases as the square of the velocity of the shot, being also in the direct ratio of its front section, while the momentum is as the velocity multiplied by the weight; it follows that a heavy shot should have a greater range than a light one; and that of two shots of the same weight, an elongated cylinder of small diameter will have a longer range than a spherical ball of greater diameter. On the other hand, from the rapid increase in a duplicate ratio of the resistance, as compared with the initial velocity, the range only increases to a certain point, in consequence of a more rapid flight of the projectile. The longest range yet attained has been by sir Joseph Whitworth with a 9-inch rifled gun, with which he sent a bolt a distance of 11,243 yards, or 6 miles 683 yards.

RANGELEY LAKES, a series of lakes in n.w. Maine, in the great lumber region of Franklin and Oxford counties, forming a portion of the most picturesque scenery in the state. The chain consists of a number of distinct bodies of water connected by small streams. The most remote, Oquossuc or Rangeley lake, 1511 ft. above the level of the sea, is thus connected with Umbagog, partly in New Hampshire, 1256 ft. above the sea, making a distance of nearly 50 m., comprising a water surface of 80 sq. miles. The lakes abound in salmon and other delicate fish, two species of trout, weighing 10 lbs., being found in these waters only, and secured with little trouble. They are designated as Rangeley, Cupsuptic, Mooselucmaguntic, Molechunkamunk, or Upper Richardson, Lower Richardson, and Umbagog, and are a favorite resort for artists, tourists, and sportsmen.

RANGOON', the principal sea-port and chief t. of Pegu (q.v.), is built on the left bank of the Ragoon river, the eastern branch of the Irrawaddy, at the distance of 26 m. from the sea, in lat. 16° 42′ n., and long. 96° 13′ east. Rangoon was founded or rebuilt by the great Alompra in 1755. The British flag was first planted in the town, May, 1824, when the Anglo-Indian troops took possession of it at the commencement of the first Burman war. The second Burman war began with the bombardment of Rangoon, April 11, 1852, and it was captured April 14 by the united forces of Bengal and Madras. At the close of the contest Pegu was annexed to British India, and Rangoon became a part of the same territory. Pop. '69, 87,558; of whom 1627 were Christians, 11,997 Mohammedans, 5,998 Hindus, 62,054 Burmese, and 5,887 others. Pop. '72, 98,745. A great change has taken place in Rangoon under the dominion of the British, and large sums have been expended on its improvement. Capital roads and streets now intersect every part of the town. The native town is of a very mean appearance, but many substantial buildings of brick or stone have been erected by the European inhabitants. Rangoon possesses a government naval yard, and a patent slip for repairing ships.

Rangoon is a stronghold of Buddhism, and on every side are seen gigantic monuments that from age to age have been erected by the followers of Gau-ta-ma; pagodas, temples, images, wonderful in their vastness and grotesque splendor. Of these, the most notable is the famous *Shouy Dagon*, or golden dagon dagoba, or shrine, the foundation of which is said to have been laid 2,300 years ago. It lies about 2. m. n. of the town, on elevated ground, and the area on which it stands is 800 ft. square. The dagoba itself is a stupendous mass of solid masonry, tapering gradually from an octagonal base of 1355 ft. to a spire of small circumference, which is surmounted by the sacred *tee*, or umbrella of open iron-work. The whole building is one dazzling blaze of gold, and altogether forms a most magnificent object, its magnitude and massiveness being very remarkable. This celebrated monument derives its peculiar sanctity from being the depository, according to Burman tradition, of relics of the last four Buddhas—viz., the staff of Kan-tha-than, the water-dipper of Gau-na-gon, a garment of Ka-tha-pa, and eight hairs from the head of Gau-ta-ma. The shrine is surrounded by numerous temples, containing colossal images of Gau-ta-ma, richly gilt, and sitting in solemn conclave, cross-legged, like so many tailors at a Quaker's meeting.

Rangoon, possessing a continuous water-communication with the upper provinces and the Burman kingdom, is very favorably situated for internal as well as for foreign commerce. There are 5 light-houses on the Burmese coast to guide vessels to the port. Teak-timber and rice are the principal exports by sea, but they also include cotton, cutch, hides, ivory, jade, kerosene, petroleum, precious stones, shellac, and tobacco. The imports by sea consist of betel-nut, cotton twist, cotton piece goods, crockery, cutlery, hardware, silk and woolen piece goods, raw silk, spirituous liquors, and wines. The annual value of exports from Rangoon amounts to above £2,500,000, and this sum is exceeded by the value of the imports. The town is fortified and garrisoned. An English newspaper is published here.

RANK. *Army rank* is somewhat confusing from its varieties, and from the fact that the same officer may hold at once three different ranks. The first and only rank up to the grade of capt. is *regimental* or *substantative* rank. Above this, officers may advance in two ways: first up to the rank of lieut.col. by substantative or regimental rank; second, up to col. by obtaining rank in the army, generally called *brevet rank*, and above that by army rank through the several grades of general officers. In his regiment, the officer holds only his regimental rank, whatever his brevet rank may be; but among officers of the army generally he takes precedence according to his brevet rank. In describing an officer who has brevet rank, his regimental rank is placed first—as, capt. and brevet lieut.col. Brown, which means that an officer named Brown, who holds rank in a regiment as capt., has for his services been promoted in the army to be lieut.col. Officers of the foot-guards have higher rank in the army. See FOOT-GUARDS. Another class of rank is relative rank, which attaches to certain officers. Thus capt. Brown aforesaid, in addition to regimental rank as capt., and army rank as lieut.col., may possibly hold a staff appointment which confers on him the relative rank of col. *Local rank* is a common expedient for advancing comparatively junior officers to important duties, a higher rank than that properly held in the army being assigned to an individual within certain geographical limits, as in the East Indies, the Crimea, etc. *Temporary rank* is similarly limited by time, and is conferred usually for the period during which some appointment is held, as the officer acting as director of ordnance ranks as maj.gen. while so employed. *Honorary rank* carries neither duty nor emoluments; it is commonly given to the amount of one step to an officer who has served the time necessary for retirement; thus, a capt., after thirty years' service, may retire (on the pay of capt.) with the honorary rank of maj. Officers who have quitted the army are also allowed to retain as honorary the last rank they held.

Navy rank has no irregularities: it is plainly what it professes to be. The marines rank with corresponding grades in the army; and their and the army rank, as compared with the navy, will be shown under Relative Rank (q.v.).

RANK and FILE, the body of soldiers constituting the mass of the army, and including corporals, bombardiers, and privates. Rank and file means literally the lines of men from side to side, and from front to back—a rank being a row of men standing side by side, and a file of soldiers a line of men standing one behind another. The strength of a force is reckoned by its rank and file; the non-commissioned and commissioned officers forming the supernumerary ranks charged with the direction of the mass.

RANKÉ, Leopold, one of the most distinguished modern historians of Germany, was b. at Wiehe, in Thuringia, Dec. 21, 1795, and educated for a school-master. In 1818 he was appointed rector of the gymnasium at Frankfort-on-the-Oder; and in 1824 published at Berlin his first work, *Geschichte der Roman. und German. Völkerschaften von* 1494–1535. It attracted considerable notice; and in the following year he was called to Berlin as extraordinary prof. of history at the university, where his lectures soon began to be numerously attended. About this time his attention was directed to the historical value of the reports sent home by the Venetian ambassadors at the different European courts during the 16th and 17th centuries, and the result of his studies and investigations among these was his *Fürsten und Völker von Südeuropa im* 16 *und* 17 *Jahrh.* (Berl. 1827), in which the affairs of Turkey and Spain are especially handled. Immediately after the publication of this work he commenced a four years' tour through Europe, for the purpose of examining the archives of the different nations. The fruit of his varied researches partly appeared in his *Serbische Revolution* (Berl. 1829); *Verschwörung gegen Venedig im J.* 1688 (Berl. 1831), and *Vorlesungen zur Geschichte der Ital. Poesie* (Berl. 1837); but a much greater and more valuable performance than any of these was *Die Röm. Päpste, ihre Kirche und ihr Staat im* 16 *und* 17 *Jahrh.* (3 vols., Berl. 1834–36; 3 ed., Berl. 1844–45), a work which, on account of its important conclusions regarding the character and policy of the papacy, many of which it may be said to have almost placed beyond controversy, was not only received with unbounded applause in Germany, but was translated again and again in Holland, England, France, and America, and may be regarded as one of the most widely-circulated and influential histories of modern times. It was followed up by his *Deutsche Geschichte im Zeitalter der Reformation* (6 vols. Berl. 1839–47), considered in Germany his most finished and thorough production, and in the composition of which he was enabled to avail himself of many documents never before published or made use of. In a still higher degree than in his earlier writings, we find displayed here his skill in grouping events together in a vivid and intelligent manner, placing them before the eye of the reader in their whole significance, with all their causes, relations, and consequences. Ranké's next effort, *Neun Bücher Preuss. Geschichten* (1847–48), remodeled and re-issued in 1875 under the title *Genesis des Preussischen Staates*, may be regarded as continuing his history of Protestantism, and was worked up from the Prussian historical archives, opened to literature for the first time. The stormy period of 1848 found him in the Frankfort parliament; but he did not acquire any distinction in that arena of babbling and incompetent patriots, and soon betook himself again to more familiar and more valuable labors. His *Franz. Geschichte vornehmlich im* 16 *und* 17 *Jahrh.* (1852–57) is an admirable work, full of new information and enlightened views; and his *exposé* of the reign of Louis XIV. is put, even by French critics, on a level with that of Voltaire. Still later are his *Englische Geschichte vornehmlich im* 16 *und* 17 *Jahrh.* (1859–67, Eng. trans. 1875); *Die Deutschen Mächte und der Fürstenbund;* and his memoir of *Hardenberg* (1877). A collected edition of his works was begun in 1874. Ranké became ordinary prof. in 1834, and was ennobled in 1866. He has trained a numerous body of historical students.—Ranké has three brothers, Friedrich Heinrich Ranké (born 1797), Karl Friedrich Ranké (born 1802), and Ernest Ranké (born 1814), who have also risen to eminence as churchmen and scholars.

RANKIN, a co. in s. Mississippi, having the Pearl river for its w. boundary and the Strong river on the s.e.; 800 sq.m.; pop. '80, 16,752—16,701 of American birth, 9,560 colored. It is intersected centrally by the Vicksburg and Meridian railroad Its surface is generally level, with dense forests of oak, hickory, beech, and pine upon the hills, and groves of magnolia, beech, and elm along the water-courses. Its soil is fertile, adapted to the raising of cotton, corn, rice, oats, wool, and live stock. Co. seat, Brandon.

RANKINE, William John Macquorn, 1820–72; b. Edinburgh; studied with his father a retired lieut. of the rifle brigade, attended lectures in the university of Edinburgh, and afterward studied natural philosophy. In his youth he was author of a remarkable paper on the use of cylindrical wheels for railway carriages. In 1841–51 he was employed on the railways of Scotland as a civil engineer. He made an investigation into the theory of molecular vortices, an account of which he published in 1849, and was elected a fellow of the Royal society of Edinburgh. He published in the *Philosophical Magazine* a paper on the *Centrifugal Theory of Elasticity as applied to Gases and Vapors.*

In 1843 he was elected an associate of the institution of civil engineers. Other articles appeared in the scientific journals from his pen. He resided a year in Glasgow, and addressed the philosophical society there; became fellow of the Royal society of London, and gave a course of lectures in the university at Glasgow; was elected regius professor of civil engineering in that institution. He was a contributor to the *Encyclopedia Britannica;* and in 1869 published a *Cyclopedia of Machine and Hand Tools,* containing 155 pages of copper-plate engravings, with descriptive letter-press. He stood at the head of the scientific engineers of England.

RANKING AND SALE is, in Scotch law, an action whereby the land or heritable property of an insolvent person is sold, and the proceeds divided among the creditors. The main object is to sell the property in spite of the debtor, and have the proceeds distributed among the creditors, for which purpose it is necessary to arrange or rank the creditors according to their respective legal priorities. The sale takes place in the parliament house at Edinburgh, one of the macers acting as auctioneer. If no offerers appear, the sale is adjourned, and the upset price is lowered.

RANKNESS, an excessive luxuriance of growth in vegetables, a condition as unfavorable as its extreme opposite to their health and to the productiveness of crops. It is often caused by injudicious manuring, and is most frequent in moist seasons. The decay of mushrooms in pastures, as in fairy rings (q.v.), sometimes produces a rankness of grass which causes all animals to refuse it; such herbage abounding to an unusual degree in chlorophyll (q.v.), but being very deficient in those qualities which render herbage most palatable and nutritious to cattle. Rankness in grain-crops is attended with a diminished production of grain, the flowers often proving abortive, and with a much increased liability to the attacks of parasitic fungi. In fruit-trees, it displays itself, even when the soil is only a little too rich, in a tendency to the production of shoots and foliage, instead of blossoms and fruit, and is to be counteracted by withholding manure, by root-pruning, or by cutting away portions of bark. In wall-trees, deep cuts may even be made into the wood, although in standards this would involve a danger of destruction by the next storm.

RAN'NOCH, MOOR AND LOCH. The moor, in the n.w. extremity of Perthshire, with a mean elevation of about 1000 ft. above sea-level, is a wild waste, 28 m. long, and 16 m. broad, and is one of the largest and most desolate and dreary moors in Scotland. Its surface is for the most part a broad, silent, and featureless tract of bog, heath, and rock, girdled by distant and gloomy mountains. In its western part is loch Lydoch, which winds amid flat and dismal scenery. Stretching eastward from the moor is loch Rannoch, about 9 m. long by from 1 to 2 m. broad. It is surrounded by mountains, contains two islands, and is drained of its surplus waters by the Tummel, a tributary of the Tay.

RANSOM—corrupted from the Latin *redemptio*—is the price paid by a prisoner-of-war, or paid on his behalf, in consideration of his being granted liberty to return to his own country. In early times, when armies received little or no regular pay, the soldier looked for his reward in the booty he might capture, and this booty included the bodies as well as the chattels of the vanquished. The conqueror had the option of slaying his prisoner; but for his profit, he would make him his slave, or sell him into slavery. The transition would be natural to accepting compensation from the prisoner himself, and setting him at liberty. In feudal warfare, the ransoms formed a large portion of a soldier's gains; those for persons of low degree belonging to the individual captors; but those for princes or great nobles, to the king. Ransoms were sometimes of large amount, more than the immediate family of the captive could pay. His retainers were then required by feudal usage to contribute; as in the case of redeeming king Richard I. for £100,000, when twenty shillings was assessed on every knight's fee, and the clergy subscribed liberally. David Bruce of Scotland was ransomed for 100,000 marks, and king John of France for £500,000, payable in installments.—In modern warfare, where the fighting is performed by professional soldiers, pecuniary ransoms are scarcely ever resorted to, freedom being granted to prisoners in exchange for others of corresponding rank captured on the opposite side.

RANSOM, a co. in e. Dakota, drained by the Sheyenne river and its branches in the n.e., and several creeks and lakes in the s.; 1764 sq.m.; pop. '80, with La Moure co., 557—357 of American birth. Its surface is generally level, spreading out into broad, fertile prairies. In the n.w. is fort Ransom and a military reservation.

RANTOUL, ROBERT, JR., 1805–52; b. Mass.; graduated at Harvard in 1826, and was admitted to the bar. He represented Gloucester in the legislature 1834–37, where he advocated the abolition of capital punishment. In 1837 he was appointed a member of the state board of education, and the next year removed to Boston. He was collector of that port 1843–45, when he was appointed U. S. district attorney for Massachusetts. In 1851 he filled a part of Daniel Webster's unexpired term in the U. S. senate, and the same year was elected to congress. He was an orator of considerable power, popular with the working classes, and a radical democrat, but an opponent of the fugitive slave law.

RANULA is the term applied to an encysted tumor, containing a glairy fluid, and lying under the tongue. The ordinary method of treating such tumors is by free incision, or by cutting out a piece of the sac; and if this is not sufficient to effect a cure, the interior should be touched with nitrate of silver, or a small seton should be passed through it, with the view of destroying it by suppuration. The name of the tumor is due to the supposed frog-like form which the swelling assumes.

RANUNCULA'CEÆ, a natural order of exogenous plants, mostly herbaceous, rarely shrubs, and generally natives of cold damp climates. Some are found within the tropics, but almost exclusively in very elevated situations. The number of known species is about 1000. They occur in all quarters of the globe, but most abundantly in Europe. The leaves are generally much divided, and have dilated sheathing stalks. The calyx is of 3 to 6 deciduous hypogynous sepals; the corolla of 3 to 15 hypogynous petals, in one or more rows, sometimes assuming very remarkable forms, as in larkspur, aconite, and columbine; rarely absent, in which case the sepals are gayly colored. The stamens are usually numerous; the carpels are numerous, one-celled, sometimes united into a single many-celled pistil; the ovary with one or more ovules. The fruit either consists of dry achenia, or is berry-like or follicular.—Acridity is the prevailing character of the order, and the leaves of some species readily produce blisters; but this property disappears when they are dried or heated. Many are narcotic and poisonous; some are used in medicine, as aconite and hellebore. The seeds of *nigella sativa* were formely used instead of pepper. The fruit of the May apple or wild lemon (*podophyllum peltatum*) of North America may be eaten, but is very acid.—Many of the order produce flowers of great beauty, as some species of *ranunculus* (q.v.), *anemone* (q.v.), *larkspur* (q.v.), *peony* (q.v.), *columbine* (q.v.), *clematis* (q.v.), etc.

RANUN'CULUS, a genus of plants of the natural order *ranunculaceæ;* having five sepals; five petals, with a nectariferous pore at the base of each petal, often covered with a scale; many stamens situated on a receptacle, and germens accumulated into a head. The species are numerous, herbaceous plants, mostly perennial. Some of them adorn meadows with their yellow flowers, familiarly known as *buttercups;* others, known by the name of *crowfoot*, are troublesome weeds in gardens and pastures. Many, as the spearworts, are found chiefly in moist places, and some are altogether aquatic, covering the surface of ditches, ponds, and rivers, where the water is shallow, with a carpet of verdure exquisitely studded with beautiful white flowers.—One species, the Asiatic Ranunculus, or Garden Ranunculus, exclusively the ranunculus of florists, a native of the Levant, has been cultivated in Europe for almost 300 years. From clusters of small tubers it sends up several bipartite leaves, and an erect branched stem, with terminal flowers, which, in the cultivated varieties, are often double or semi-double, yellow, white, red of various shades, or of mixed colors, very brilliant, and from an inch and a half to two inches and a half in diameter. The cultivated varieties are extremely numerous. The ranunculus is propagated by seed, by offset tubers, or by dividing the clusters of tubers. The roots are often taken up in summer, after the leaves die, and kept in a dry place till the beginning of the ensuing winter or spring. Protection by frames and glasses, shading from strong sunshine, and other such means, are employed in order to increase the beauty of the flowers. The ranunculus loves a free and rich soil. Double-flowered varieties of some other species, with taller stems and smaller white or yellow flowers, are cultivated in flower-gardens, sometimes under the name of *bachelor's buttons.* The acridity of many species of ranunculus is such that the leaves, bruised and applied to the skin, produce blisters; and those of *R. sceleratus*, a pretty common British species, are said to be used by beggars to cause sores, in order to move compassion. *R. thora*, a Swiss species, is of extreme acridity, and hunters were accustomed, in former times, to poison darts and arrows with its juice. Water distilled from the leaves of *R. flammula*, a British species, with rather tall stem and ovato-lanceolate leaves, common by the sides of ditches, etc., is an active and powerful emetic, producing almost immediate vomiting, and capable of being used with great advantage in cases of poisoning.—Yet the leaves of *R. ficaria*—sometimes called *pilewort* and *lesser celandine*, a very common British species, adorning hedge-banks with bright yellow flowers in spring—are capable of being used as a pot-herb. Pastures in which *R. acris*, *R. repens*, etc., are very abundant are injured by them, and they ought to be diligently grabbed out; they are particularly supposed to give an unpleasant taste to milk and butter; but it is thought not improbable that a moderate mixture of these plants with the other herbage is even advantageous, and that they may act as a condiment. Their acridity is lost in drying, and they are not injurious to hay. The small tubers of pilewort, or lesser celandine, are used for the cure of hemorrhoids; but their acridity also disappears when they are boiled, and they are then a pleasant article of food.

RANZ DES VACHES (in German, *Kuhreigen*), a name applied to certain simple native melodies of the Swiss Alps, which are usually sung by the herdsmen, and played by them when driving their herds to and from the pasture, on an instrument called the *alphorn*, consisting of a wooden tube somewhat bent, about three feet long, widened out into a bell, and bound by a pitched cord. The associations of pastoral life recalled by these airs to the Swiss in foreign countries, have been said to produce that unaccountable longing for home, or *nostalgia*, which has been remarked among the Swiss soldiers abroad. The bands of the Swiss regiments in foreign service have, on this account, to be, prohibited from playing the Ranz des Vaches. The Ementhal, Entlebuch, the Bernese

Oberland, the Grisons, Appenzell, and other pastoral districts of Switzerland have each their respective Ranz des Vaches. A collection of Ranz des Vaches, along with other Swiss melodies (*Sammlung von Schweizer Kuhreigen und Volksliedern*), was published at Berne, in 1818; and these airs are also to be found in the *Allgemeines Schweizer Liederbuch*, 1851. The Ranz des Vaches of Switzerland are ruder in their character than the mountain melodies of the Tyrol, with which they are sometimes confounded.

RAPAL'LO, a maritime t. of northern Italy, province of Genoa, and 17 m. e. of the city of that name, with 5,350 inhabitants. It was first called Tigulia. Its only object of interest is the sanctuary of the Madonna, on the monte Allegro, erected in 1557. Rapallo is a thriving commercial town, and has manufactures of wax and of soap, and of laces in thread and in cotton; it has fisheries of coral and tunny.

RAPE is the crime of having carnal knowledge of a woman against her consent and by force. The essence of the offense is that force be used, and it is immaterial what is the age of the woman, and whether she is married or single, chaste or unchaste. The only difference caused by the habitual unchastity of the woman is that in such a case it is less easy to satisfy the jury that the element of consent was wanting. The two elements of rape are the carnal knowledge and the force used. As to the element of resistance on the part of the woman, or force on the part of the man, several niceties often occur in the application of the law, from the great variety of circumstances attending this crime. With regard to an idiot woman, it has been held that it is not necessary to prove resistance on her part, and that the crime may be committed though she made no resistance. If consent be extorted by fear and threats, or where several men join together, and resistance is useless, this is the same as using violence to overpower the woman. Where the woman is stupefied by drink, so that the power of resistance is annihilated, it is the same as knocking her down. In a case, however, where force is used in the first instance, but the woman afterward in some degree consents, the crime of rape will not be committed, though the evidence may establish the crime of assault. Some difficult cases have occurred with reference to married women who have been beguiled by men personating their husbands, and so been, in a certain sense, cheated out of their consent. But it has been repeatedly decided by a majority of the court, both in England and Scotland, that such an offense was not rape.

One of the important circumstances attending the crime of rape is the mode of proof, and in this respect it differs from other crimes. It is held to be all but essential, as a corroboration of the woman's story, that if her cries of resistance were not heard, at all events she should have, immediately after the offense, complained on the first opportunity to her friends or relations. It is not allowed to give in evidence the particulars of such complaint, but merely the fact that she made a complaint against some person. Unless this important particular be proved, her evidence is looked upon with great suspicion, and may be discredited by the jury, unless there were peculiar circumstances to account for the want of such complaint. One of the common defenses to a charge of rape is the unchastity of the woman, the object being to render it unlikely that she did not consent, and hence it is in practice considered a proper question for the prisoner's counsel to put to her, whether she had not had connection with the prisoner before or with other men; but at the same time she is cautioned by the judge that she is not bound to answer such questions unless she likes. If, however, she denies the accusation, witnesses may be called to contradict her on that point.

The crime of rape is felony by the law of England, and is punishable by penal servitude for life, or for not less than three years, or by imprisonment not exceeding two years, with or without hard labor. Of late attempts have been made to add flogging or corporal punishment to the other punishment, but bills having that object have been thrown out of parliament. There are several other crimes in the same category as rape, but punishable under separate enactments. Thus, the crime of having carnal connection with a girl under the age of 10 years is felony, and punishable like rape. Whoever has carnal connections with a girl who is between the age of 10 and 12 years, is guilty of a misdemeanor, and liable to penal servitude for three years, or imprisonment for two years with hard labor. Consent of the girl in these two cases is immaterial. The forcible abduction of women is divided into two offenses. Wherever a woman of any age has property, and is forcibly taken away with intent to marry or carnally know her, the offense is felony, punishable by penal servitude of three to fourteen years, or two years' imprisonment. Again, if a girl, though having no property, is under the age of 21, and is fraudulently allured or taken away out of the possession of her parents or guardians, with intent to marry or carnally know her, this is felony, punishable as in the preceding case. In order to the commission of the latter offense, an improper motive is necessary on the part of the man, but the consent of the girl is of no consequence.

RAPE, or COLE-SEED (*Brassica napus;* see BRASSICA), a biennial plant much cultivated both on account of its herbage and its oil-producing seeds. It is a native of Europe, and perhaps of England; but it is hard to say where it is truly indigenous and where naturalized. It is so nearly allied to *brassica rapa* (turnip), *B. campestris* (Swedish turnip, colza, etc.), *B. oleracea* (kale, cabbage, etc.), and *B. præcox* (summer rape), that botanical distinction is difficult, particularly as to some of the cultivated varieties. Dr.

Lindley gives the following synoptical view of the most characteristic differences of these species, in Morton's *Cyclopædia of Agriculture:*

Leaves bright green	*B. rapa.*
Leaves glaucous—	
Leaves hispid when young	*B. campestris.*
Leaves never hispid—	
Siliques spreading	*B. napus.*
Siliques erect—	
Calyx erect	*B. oleracea.*
Calyx spreading	*B. præcox.*

The root of rape is slender, or in cultivation sometimes becomes carrot-shaped (see NAVEW); but it never becomes turnip-shaped. The stem is taller than that of the turnip, or Swedish turnip, and the foliage more luxuriant. The cultivation of rape is very general in many parts of the continent of Europe, from which it seems to have been introduced into England at least as early as the 16th c.; and in the 17th c., if not sooner, large quantities of oil were made from its seeds, chiefly in the fenny and other alluvial districts of the east of England, where also it has long been most extensively employed for feeding sheep. On the continent it is not unusual to sow rape in order to *green-manuring,* plowing its herbage into the soil, a mode of enriching land much more common in some parts of Europe than it is in Britain. Rape delights in a rich alluvial soil, and is particularly suitable for newly-reclaimed bogs and fens, in which the turnip does not succeed well; but it is also extensively cultivated in the chalk and oolite districts of the south of England. The mode of cultivation does not differ much from that of turnip, and similar manures are used. In rich soils rape sometimes attains a height of three, or even four feet, so that the sheep turned in are hidden beneath the leaves and seem to eat their way into the field. They eat the stalks even more greedily than the leaves. A too exclusive feeding on rape is, however, apt to produce diseases, which a sprinkling of salt, a supply of hay, etc., are found useful in preventing. When rape is cultivated for seed it is sown in autumn. When the seed is ripe rape is cut with the sickle, and after a short time allowed for drying, the seed is thrashed out, when the haulm is often burned, a wasteful practice, as its decay affords more abundant and useful manure, and indeed cattle are fond of it as food. *Rape-cake,* the mass of seeds from which oil has been obtained by crushing, is used for feeding oxen and sheep, but is very inferior to linseed-cake and some other kinds of oil-cake. Ground into dust it is a very valuable manure. *Rape-oil* is extensively used for machinery and for lamps; but the oil and cake so called are not exclusively obtained from this plant, nor are the names *colza-oil* and *rape-oil* used to discriminate the produce of different plants, although in some parts of Europe the name colza is given to varieties of *brassica campestris* and *B. oleracea,* which are cultivated in the same way as rape. *B. præcox* is also cultivated in some places, being sown in spring and reaped in autumn. The seeds of other cruciferous plants are also crushed indiscriminately with these, and the oil and cake sold by the same names. See OILS.—The name *rape* is from the same root as Ger. *reps,* and Lat. *rapa* (a turnip); *cole-seed* and *colza* from the same as *kale.*

RAPHAEL, or RAFFAELLO SANTI, or SANZIO, called by his countrymen *Il Divino,* "the divine," is ranked by almost universal opinion as the greatest of painters. He was b. at Urbino in 1483, and in 1497, on the death of his father, Giovanni Santi, who was his first instructor, he was placed under Pietro Perugino, the most distinguished painter of the period, who was then engaged on important works in the city of Perugia. In 1504 Raphael visited Florence, and improved his style by studying composition and expression in the works of Masaccio, and color and effect in those of Fra Bartolomeo. He seems to have lived in Florence till 1508, when he went to Rome on the invitation of pope Julius II. His celebrated frescoes in the Vatican and numerous important works were then commenced. Julius died in 1513, but his successor, Leo X., continued Raphael's services, and kept his great powers constantly in exercise. The works of Raphael are generally divided into three classes: His first style, when under the influence of Perugino's manner; his second, when he painted in Florence from 1504 to 1508; and his third style, which is distinguishable in the works executed by him after he settled in Rome. Each of these styles has its devoted admirers. Those who incline to art employed in the service of religion prefer the first manner, as embodying purity and religious feeling. His last manner, perfected when the taste for classical learning and art was strongly excited by the discovery of numerous valuable works of the classic period, is held by many connoisseurs as correctly embodying the highest art; while his middle, or Florentine style is admired by some as exemplifying his powers, freed from what they deem the rigid manner of Perugino, and untainted by the conventionalism of classic art. In all these different styles he has left works of great excellence. "The Coronation of the Virgin," in the gallery of the Vatican, and "The Sposalizio," or Marriage of the Virgin, in the Brera gallery at Milan, belong to the first period. The "St. Catharine," in the national gallery, London; "The Entombment," in the Borghese gallery, Rome; "La Belle Jardinière," in the Louvre, to his second period. While the "St. Cecilia," at Bologna; the "Madonna di San Sisto," at Dresden; "The Cartoons," at Hampton court; "The Transfiguration," and all the Vatican frescoes, except "Theology; or, the Dispute on the Sacrament," the first he executed on his arrival from Florence; are in his third manner, or that which peculiarly marks the Roman school in its highest development. Raphael died at Rome on April 6th, 1520, the anniversary of his birthday.

RA'PHALL, Morris Jacob, ph.d., 1798–1868; b. at Stockholm, Sweden, of Jewish parentage; educated in the Jewish college of Copenhagen; received in his 13th year the Hebrew academic degree which procured for him the title of rabbi. In 1812 he went to England, where he spent six years studying the English language; then traveled, and studied at the university of Giessen 1821–24. In 1825 he settled in London; gave lectures in 1832 on the Biblical poetry of the Hebrews; in 1834 published the *Hebrew Review;* in 1841 was appointed rabbi preacher of the synagogue at Birmingham. In 1849 he was invited as rabbi preacher to the Anglo-German congregation of the "great synagogue" *B'nai Jeshuran* in New York. His principal published works are the *Post-Biblical History of the Jews*, 2 vols.; translations of *Eighteen Treatises of the Mishna* jointly with D. A. de Sola; and other translations from Hebrew writers.

RAPHA'NIA, or Ergotism, is a disease which was much more prevalent some centuries ago than it is at present. It is defined as "a train of morbid symptoms, produced by the slow and cumulative action of a specific poison peculiar to wheat and rye, and which gives rise to convulsions, gangrene of the extremities, and death" (Aitken's *Science and Practice of Medicine*, 1858, p. 332). It has been described under various names. From the 10th to the 14th centuries it was known as *St. Anthony's fire*, a title which has been since associated with erysipelas. It was then described as epidemic gangrene. The name *raphania* was first given to it by Linné, who thought the morbid symptoms were dependent upon the mixture of *raphanus raphanistrum*, or jointed charlock, with the wheat used as food. It was suspected as early as the end of the 16th c. that the disease was due to the development of a fungus on the grain, and this fact is now established beyond doubt, although some writers hold (like Linné) that this morbid state is also produced by the admixture of poisonous plants, especially *lolium temulentum* or darnel being mingled with the grain. Although rye is the ordinary seat of the poisonous fungus, wheat, rice, and other grains are liable to be similarly affected, and to produce similar results. For an account of the fungus see Ergot.

There are two forms of the disease—the spasmodic and the gangrenous. The spasmodic form begins with tingling or, itching of the feet and hands and sometimes of the head. Violent contractions of the hands and feet, giving rise to intense pain in the joints, are a common symptom. The head is much affected, the patient complaining of drowsiness, giddiness, and indistinct vision. If coma or epileptic convulsions supervene there is little hope of recovery. The appetite is usually enormous; spots like those of purpura appear on the face, and there are seldom any signs of improvement for some weeks. The gangrenous form begins with extreme lassitude, and is accompanied by some febrile disturbance. The extremities are painful, cold, almost insensible, and not readily moved; and after a varying time gangrene supervenes.

With regard to treatment, the first thing to do is to replace the poisonous flour by easily-digested, nourishing, wholesome food. The pain must be relieved by opiates, the blood purified by the administration of chlorate of potash, and the general tone of the system improved by tonics, such as the preparations of iron, bark, etc. In the spasmodic form warm baths and gentle friction would probably prove serviceable. Whatever be the form of treatment adopted the mortality in the gangrenous form is usually 90 per cent. The spasmodic form is much less destructive to life.

RA'PHIDES are crystals found in the interior of the cells of plants. The word is the plural of the Greek *raphis*, a needle, and was originally used to denominate crystals of an acicular form, which are often collected together in bundles. But crystals of various forms are found in the cells of plants, consisting chiefly of phosphate or of oxalate of lime. In many kinds of plants they very much abound, and often in a particular manner in particular parts of plants. They are very minute and are found in such delicate tissues as the petals of the pelargonium.

RAP'IDAN. See Rappahannock.

RAPIDES', a parish in central Louisiana, on the Calcasieu and Red rivers; bounded n.e. by Saline bayou; traversed by the New Orleans and Texas Pacific railroad; 1400 sq.m.; pop. '80, 23,597—23,237 of American birth; 14,071 colored. The surface is level and there are extensive pine forests; cotton, sugar, corn, and pork are the staples. Chief town, Alexandria.

RA'PIER is said to have had distinct meanings at different times, and in ancient fencing to have been a long cutting broadsword; but for the last century at least the rapier has been a light, highly-tempered, edgeless, thrusting weapon, finely pointed and about 3 ft. in length. It was for long the favorite weapon in dueling, and was worn by every gentleman. At present it is worn only on occasions of court ceremonial, and answers no other purpose than to incommode the wearer. In war a rapier could never have been of any service.

RAPIN DE THOYRAS, PAUL DE, a French historian of England, was descended from a Protestant Savoyard family, which settled in France in the 16th c., and was born at Castres, in Languedoc, Mar. 25, 1661. He studied at the Protestant college of Saumur, and passed as advocate in 1679, but had no liking for the profession; and when the edict of Nantes (1685) forced him to leave France, he sought employment first in England (where he was unsuccessful), and afterward in Holland, where he enlisted in a corps of volunteers at Utrecht, formed by his cousin-german, Daniel de Rapin. With his company he followed the prince of Orange to England in 1688, was made ensign in the following year, and distinguished himself by his bravery at the siege of Carrickfergus, the battle of the Boyne, and the siege of Limerick, where he was shot through the shoulder by a musket-ball. In 1693 he was appointed tutor to the earl of Portland's son, with whom he traveled in Holland, Germany, and Italy, after which he took up his residence at the Hague; but in 1707 withdrew with his family to Wesel, in the duchy of Cleves, where he devoted the remaining 17 years of his life to the composition of his great work. The severity of his labors is believed to have shortened his days. He died May 16, 1725. Rapin's *Histoire d'Angleterre* was published at the Hague in 8 vols. the year before his death. It was undoubtedly, as Voltaire has said, the best work on English history that had until then appeared: full, minute, careful in citing authorities, clear, rapid, and accurate in narration, methodical in the arrangement of its materials, comparatively impartial in spirit, and yet betraying on the part of the author an honorable reverence for law and liberty. Rapin begins with the invasion of Britain by the Romans, and ends with the death of Charles I. The work was continued to the death of William III. by David Durant (Hague, 2 vols., 1734). The best edition of the *Histoire* in its augmented form is by Lefebvre de Saint-Marc (Hague, 16 vols., 1749, *et seq.*). The original was translated into English by the rev. Nicholas Tindal, M.A. (Lond. 15 vols., 1725–31), and subsequently by John Kelly, barrister (in 2 vols. fol.).

RAPP, GEORGE, and FREDERICK. See HARMONISTS.

RAPP, JEAN, Count, a French gen., was b. at Colmar, in the department of Haut-Rhin, France, April 27, 1773. He was intended for the church, but his taste for a military life led him to enroll himself (1788) in the mounted "chasseurs" of the French army. Rapp distinguished himself by dashing gallantry in Germany and Egypt, and on the death of Desaix at Marengo he became aide-de-camp to Napoleon. His brilliant charge at Austerlitz upon the Russian imperial guard, which put the latter to a complete rout, was rewarded with the grade of gen. of division (Dec. 24, 1805). But Rapp joined to the utmost bravery and coolness a quick and unerring judgment, which enabled him not only fully to comprehend Napoleon's plans, and execute to the spirit the duties intrusted to him, but also at times to amend and even disobey his orders with the happiest results. The latter was the case at Lobau, where Rapp's disobedience decided the battle in favor of Napoleon; and for this service he was named a count of the empire (Aug. 1, 1809). He opposed the Russian expedition with the utmost earnestness; but, notwithstanding, accompanied the emperor throughout the whole of it, adding on many occasions to his own reputation and the glory of the French arms. His obstinate defense of Dantzic for nearly a year against a powerful Russian army placed him in a high position among military men; and his chivalrous and considerate treatment of the unfortunate inhabitants during the siege was so warmly appreciated by them that they presented him with a magnificent sword enriched with diamonds. The Russians, contrary to the articles of capitulation, sent Rapp and his garrison prisoners to Russia, and he did not return to France till July, 1814. On reaching Paris he was well received by Louis XVIII.; and in March, 1815, was one of those appointed to oppose the return of Napoleon; but deserted, along with his troops, to his old master, and was appointed commander-in-chief of the army of the Rhine (April 16), and peer of France (June 2). After Waterloo, Rapp again submitted to Louis, but retired to Switzerland for two years, returning in 1817, and receiving a full pardon in the following year. He was re-created a peer of France (March 5, 1819), and held various offices about the court; but, broken in health by constant hard service and numerous severe wounds, he died at Paris, Nov. 8, 1821. A volume of memoirs (1823, in 8vo) has been published under his name.

RAPPAHAN'NOCK, a river of Virginia, formed by the union of the North Fork and the Rapidan, which rise in the Blue ridge of the Alleghany mountains, and flow eastwardly to their point of union, 40 m. above Fredericksburg, where the falls afford water-power. The river is navigable from this point s.e. to Chesapeake bay, which it enters by a broad estuary, 70 m. long. The Rappahannock and the Rapidan were the scenes of some of the most sanguinary battles of the war of secession, at Fredericksburg, Chancellorsville, and the Wilderness.

RAPPAHAN'NOCK, a co. in n. Virginia, lying on the w. slope of the Blue ridge range; drained by the Hazel and Rappahannock rivers; 230 sq.m.; pop. '80, 9,297—9,276 of American birth; 3,536 colored. The surface is very hilly, there is much beautiful scenery, and the valleys are of great fertility; wheat, corn, grass, and pork are the staples. Co. seat, Washington.

RAPPAREE', a wild Irish plunderer, so called from his being generally armed with a *rapary*, or half-pike. The term was in common use in the 17th century. See *Notes and Queries*, Aug. 17, 1861.

RAPPEE', a coarse-grained species of snuff (q.v.). The word is of French derivation, and arose from this species of snuff being manufactured from dried tobacco by means of the *râpe* or *raspe*, an instrument by which the thin parts of the leaf were cut from the veins and fibers, the latter alone being used in the manufacture of rappee.

RAP'PEN, a small Swiss coin, made of an alloy of copper and tin, forming the $\frac{1}{100}$th part of the modern franc (q.v.), and therefore equivalent to the French centime. The old Swiss franc (= about 1s. 2d. sterling) was also divided into 100 rappen. The rappen was first coined at Freiburg, and took its name from the head of a raven (Ger. *rabe*, pronounced in some parts *rape*) impressed upon it.

RAPTO'RÉS. See Accipitres.

RARATON'GA. See Cook Islands.

RAR'ITAN, a river in n. New Jersey, 33 m. long, formed of two branches, the n. branch rising in the highlands of Morris co., and the s. branch finding its source in Morris co., flows through Hunterdon co., uniting with the n. branch to form the Raritan in central Somerset co., thence intersecting Middlesex co., empties into Raritan bay at Perth Amboy. In its course it passes the cities of Somerville and New Brunswick, and is navigable to the latter city, 15 m. above its mouth.

RAS = (Heb. *rosh*), an Arabic word, signifying "head," "promontory," occurs in the names of many capes on the Arabian and n. African coasts, and also in Sicily and Malta; as Rasigelbi (corrupted from Rasi-calbo), "the dog's cape," on the n. coast of Sicily; Ras-el-Abyad, "white cape," on the coast of Palestine; Ras Bab-el-Mandeb, "cape of the gate of tears," at the strait of Bab-el-Mandeb; Ras-el-Jezirah, "cape of the peninsula;" Ras-el-Had, the eastern point of Arabia.

RASHES, affections of the skin, characterized by a red superficial efflorescence, diffused or in patches, disappearing under pressure, and usually ending in desquamation. To this division of cutaneous disorders belong rubeola (or measles), scarlatina (or scarlet fever), erysipelas (or St. Anthony's fire), erythema, roseola (or scarlet-rash), and urticaria (or nettle-rash). Of these rashes, rubeola, scarlatina, and erysipelas are rather to be regarded as fevers or blood diseases than as cutaneous diseases, in the true sense of the phrase.

RASHI (i.e., Rabbi Solomon [Shelomo] Izaaki, or Ben Izaak, often erroneously called Jarchi), the greatest Jewish commentator and exegete, was born about 1040, in Troyes, in France. The range of his studies was as extraordinarily wide as were his early developed faculties brilliant, and his industry and perseverance enormous. Philology, philosophy, medicine, astronomy, civil and canonical law, exegesis, were the chief branches of his learning; and to a rare proficiency in them, he united a complete mastery over the whole range of Scripture and the Talmudical sources. In order further to perfect himself for his gigantic task, he traveled for seven years, visiting the academies of Italy, Greece, Germany, Palestine, Egypt, where he sat at the feet of the great masters of the age, collecting their sayings and legal decisions. His chief work—and one universally recognized as the principal work of all scriptural exegesis—is his commentary to the whole of the Old Testament. Up to this day it has not been superseded by any other, although in the province of philology and antiquities, investigation has been much furthered since his time. Rashi's style is extremely brief and concise, yet clear and pregnant; obscure and abstruse (as it has been pronounced by some) only to those who lack the necessary preliminary knowledge. According to the fashion of its day, it is replete with allegorical or rather poetical illustrations, gathered from the wide fields of the Midrash within and without the Talmud; and many a passage is thus preserved to us, which, in the disordered state of those manuscripts, would probably otherwise have been lost. This commentary—entirely translated into Latin by Breithaupt, and partly also into German—was the first book ever printed in Hebrew (Reggio, 1474), and has since been reprinted with almost every complete edition of the Hebrew Bible. Of his numerous other works is first to be mentioned his commentary to 23 treatises of the Talmud, supplemented after his death by his grandson, Samuel ben Meier; further, a commentary to the Pirke Aboth; the *pardes*, treating of laws and ceremonies; a collection of legal votes and decisions; a commentary to Midrash Rabbah; a book of medicine; a poem on the unity of God, etc., etc. He died about 1105; and such was his piety and his surpassing eminence, that later generations wove a shining garland of legends around his head. The confusion of Rashi with two Jarchis, who lived long after him, has not hitherto been properly accounted for. They bore that surname because they were born at Lunel, Jerach being the Hebrew for moon, *lune* in French.

RASK, Rasmus Christian, a distinguished Danish philologist, was b. at Brendekilde, near Odense, in the island of Fünen, Nov. 22, 1787; studied at Copenhagen, and in 1808 published his first work, *Vejledning til det Islandske eller gamle nordiske Sprog* (Rules of the Icelandic Language, or the Ancient Language of the North). During the years 1807–12 he occupied himself with drawing up grammatical systems for most of the Germanic, Slavic, and Romanic tongues, and in comparing them with those of India. He then visited Sweden, where he commenced to study Finnish; and in 1813 proceeded to

Iceland, where he lived for two or three years, perfecting his knowledge of the language, the history, and the sagas of the inhabitants. On his return to Copenhagen he was appointed sub-librarian to the university; and in 1818 published a splendid work, *Undersøgelse om det gamle nordiske eller Islandske Sprogs Oprindelse* (Researches concerning the Origin of the Icelandic or Ancient Language of the North), which led Grimm to his famous discovery of the displacement of consonants in the Teutonic languages. Previous to this, however, he had resolved to visit Asia; and after spending a year (1817) in Stockholm, where he published his admirable *Angelsaksik Sproglaere* (Anglo-Saxon Grammar), and the first critical and complete edition of the two great monuments of Scandinavian mythology, the *Snorra Edda* and the *Edda Saemundar*, he went to St. Petersburg, where he devoted himself for two years, with intense eagerness, to the study of the oriental languages, principally Sanskrit, Persian, and Arabic, but not failing to acquire, at the same time, a competent knowledge of Russian and Finnish. Thus equipped he proceeded to Astrakhan, where he stayed six weeks, to study the language of the Tartars, and then commenced a journey through the country of the Turkomans, the Caucasus, Persia (where he added the Mongol and Mantchu dialects to his already enormous linguistic acquisitions), Hindustan (cultivating in the last-mentioned country the society of learned Brahmans, and visiting all their great schools), and finally Ceylon, where he made himself acquainted with Cingalese and Pali, and wrote his *Singalesisk Skriftlaere* (Colombo, 1822). In 1823 Rask returned to Copenhagen, laden with learning and rare manuscript treasures, of which the greatest part was presented to the university. In 1825 he was appointed professor of "literary history," and in 1828 of oriental languages. Next year he was made chief custodier of the university library; and in 1831. professor of Icelandic. But his immense labors had exhausted his energies, and he died Nov. 14, 1832, at the early age of 45, a victim of hard work. Besides the productions already mentioned, Rask wrote *Frisisk Sproglaere* (Cop. 1825); *Den gamle Aegyptiske Tidsregning* (The Ancient Egyptian Chronology, 1827); *Den aeldeste Hebraiske Tidsregning* (The Oldest Hebrew Chronology, 1828); besides grammars of several languages, and a great number of miscellaneous articles in the learned journals of the north, which were collected after his death, and published (Cop. 3 vols., 1834–38), together with a life by Petersen.

RASKOL'NIK (Russ. *separatist*), the name of a variety of sects in the Russian church, which date from an early period, and must be regarded rather as a general designation of dissenters from the established church of Russia, than as a description of any specific form of doctrinal belief. Such dissent is traceable from the very earliest period of the distinct organization of the Russian church. A monk, named Andrew, in 1003; another, called Demitry (Demetrius), in the 12th c.; an Armenian monk, named Martin, who was burned as a heretic at Constantinople in the end of the same century; Leo, bishop of Rostow, in the beginning of the 14th, and Strigolnik and Nikita toward its close—are all mentioned as having originated or propagated heresies of various kinds. A still more remarkable and more formidable organization—a form of Crypto-Judaism—was introduced in the 15th c. by a concealed Jew, called Zacharias, who succeeded in gaining many followers. One of these, called Zosima, is particularly noticeable as having obtained much popularity, and even managed to have himself elected metropolitan of Moscow. His sect, which studiously concealed itself wherever this concealment seemed necessary, was condemned by a synod (1490), and repressed with great rigor; but it continued to maintain a concealed and precarious footing, and is said to possess disciples even to this day, especially in the government of Irkutsk, under the name of Selesnewschtschina. A sect, whose leading principles were borrowed from the German reformers, was founded in 1553 by Matthias Baschkin; but it was condemned at a synod in Moscow, and does not appear to have taken much hold on the people.

But it is from the middle of the 17th c. that—the separation of the sects from the national church having become more tangible, from its involving non-conformity with the established worship—the designation of Raskolnik finds its fullest application. At that period a complete revision of the ancient Slavonic liturgical and ritual books, which had suffered grievously from the ignorance, and probably also from the heterodoxy of transcribers, was undertaken by the patriarch Nikon. See PHILIPPINS. The revised books were introduced into the churches by the authority of the czar as well as of the patriarch; but many of the clergy and people resisted the innovation, and refused the new liturgies. Foremost among the recusants, or non-conformists, were those who had already been sectaries upon other grounds; but all differences were to some extent merged in this common ground of protest, and all were known under the common appellative Raskolniks.

In later Russian history the Raskolniks are sometimes called by the name, which they themselves affect, of Starowierzi ("men of the old faith"), or Prawaslawnüje ("orthodox"). Each sect has its specific doctrinal peculiarities; but most of them follow certain common observances, in which lies their tangible difference from the national church. They cross themselves with the first and middle finger, and not with the first three fingers; they use only the unrevised service-books; they repeat Hallelujah only twice; in church ceremonies they turn from left to right, and not from right to left; they use seven and not five altar-breads in the eucharistic offering; they pay worship only to ancient pictures, or those painted by themselves; they use an eight-pointed instead of the ordinary cross; they attend only their own churches, and hold no communion of worship with the members of the national church; they never shave or cut their hair, and adhere strictly to the old Russian costume.

They may be divided, in general, into two classes—those which have popes (priests), and those who do not recognize the priestly order. The former are in every respect more moderate and more free from fanaticism than the Raskolniks, who discard the ministry of priests. Their priests, however, have often been outcasts of the orthodox church, who betook themselves to the rival communion. The most notable among the Raskolniks of this class are those called Peremasanowschtina, who re-ordain all popes joining their communion; the Jewlewschtschina, who are said to permit freedom of divorce and exchange of wives; Dositheowschtschina, so-called from their founder, a monk named Dositheus; and Tschernobolzi, whose chief distinction consists in refusing to take an oath, and to say the prayer for the emperor prescribed in the liturgy. Of the popeless Raskolniks, the chief are the Philippins (q.v.), the Pomorænians or Rebaptizers, the Theodosians—an offshoot of the Pomorænians—and a sect of mystic spiritualists with strong Protestant and rationalistic leanings, called Duchoborzen. A curious development of the Raskolniks movement is found in the Samokrischtchina (self-baptizers) and the Samostrigolschtschina (self-ordainers), among whom each one administers baptism to himself, each priest ordains himself, and each monk or nun performs the ceremony of their own consecration without the interposition of the regular ministry. It may be added, in conclusion, that with a considerable proportion of these various sectaries, there is found largely mixed up with religious fanaticism an element of communism and of disaffection toward the reigning dynasty, or, more properly, toward the established order of things. The latter may be in part explained by the rigorous measures of repression under which the Raskolniks have suffered for many successive generations. The former is an ordinary accompaniment of the sectarianism of the poor, and is especially frequent among sectaries of the peasant class.

RASPAIL, François Vincent, 1794–1878; b. France; fought at the barricades in the revolution of 1830. He opposed the government of Louis Philippe, and was prosecuted for his newspaper articles, and for his membership of illegal societies. In 1831 he published *Cours Elementaire d'Agriculture et d'Économie Rurale;* and in 1837 *Système de Chimie Organique.* In 1852 he was imprisoned for his opposition to the *coup d'état.* On his release he went to Belgium. He was a member of the *corps législatif* in 1869, and of the chamber of deputies 1876–77.

RASPBERRY, *Rubus idæus,* the most valued of all the species of rubus (q.v.). It has pinnate leaves, with 5 or 3 leaflets, which are white and very downy beneath, stems nearly erect, downy, and covered with very numerous small weak prickles; drooping flowers, and erect whitish petals as long as the calyx. The wild raspberry has scarlet fruit, and is found in thickets and woods throughout the whole of Europe and the n. of Asia. It is common in Britain. The raspberry has long been in cultivation for its fruit. There are many cultivated varieties, with red, yellow, and white fruit, much exceeding the wild kind in size. The stem in a wild state is 3 to 4 ft. high; in cultivation, 6 to 8 ft. or upward. Some of the cultivated varieties are also more branching than is common in a wild state, the stem of the wild plant being simple or nearly so. The root is creeping, perennial; the stems only biennial, bearing fruit in the second year, woody, but with very large pith. Plantations of raspberries are most easily made by means of suckers. The raspberry loves a light rich soil, and is rather partial to a shady situation. The tall kinds are unsuitable in situations much exposed to winds, as the stems are easily broken. The rows are generally about 4 ft. apart, the plants 3 to 4 ft. apart in the rows. The young stems are thinned out to allow free access of air to those which are left. Stakes are often used to support the stems, or they are variously tied together. The fruit is used for dessert; for jams, jellies, etc.; for making or flavoring many kinds of sweetmeats; and mixed with brandy, wine, or vinegar, for the preparation of *R. syrup, R. vinegar,* etc. Different preparations of it are used in medicine in cases of fever, inflammation, etc. Raspberry vinegar is a particularly grateful and cooling drink in fevers. Raspberries, fermented either alone or along with currants or cherries, yield a strong and very agreeable wine, from which a very powerful spirit can be made.—Some of the other species of *rubus,* most nearly resembling the raspberry, produce also agreeable fruits. *R. odoratus* is a highly ornamental shrub, a native of Canada and the northern states of America, is frequent in gardens both in Europe and America, but rarely produces its fruit in Britain.

RASPBERRY VINEGAR, a culinary preparation, consisting of raspberry juice, vinegar, and sugar. It is best made by putting carefully gathered and very ripe raspberries into jars, and when as full as they will hold of the fruit, fill up the jar with good vinegar: after 8 or 10 days, pour off the vinegar, and let the fruit drain for some hours. The mixture of vinegar and juice thus obtained is added to another quantity of fruit, and treated in the same way. This is sometimes repeated a third time, and then the liquid is gently boiled for about five minutes with its own weight of refined sugar. Added to water it forms a most refreshing summer drink, and is a useful cooling drink in sickness.

RASSEL, LOUIS NATHANIEL, 1844–71; b. France; reared a Protestant; graduate of the polytechnic school in 1862, and of the military school of Metz in 1866; soon achieved reputation as a writer on military matters. After the capitulation of Bazaine at Metz he escaped, and denounced that chief; and when Paris capitulated and terms of peace were made by the Thiers government, Rassel joined the government of Paris, which rejected peace on those terms, and fought in its service against the national forces. Taken prisoner by the latter he was tried by a court-martial for treason, and sentenced to be shot. The high esteem that his talents and character had won him were testified in petitions for clemency from his former associates who had not acted with him, but which were unsuccessful, and he was shot Nov. 28, 1871.

RASTADT, a t. and fortress in Baden, stands on the river Murg, 3 m. from its junction with the Rhine, and 15 m. s.w. of Karlsruhe. It is a station on the Baden railway. Steel wares, weapons, and tobacco are manufactured. From 1725 to 1771 the town was the residence of the margraves of Baden-Baden. From 1840 till 1866 the fortress of Rastadt was occupied by the troops of the Germanic confederation. Rastadt is memorable for two congresses—the former in 1714, when a treaty of peace, which brought the war of the Spanish succession to a close, was signed between marshal Villars and prince Eugene; and the latter in 1799. On the breaking up of the congress of 1799 without any definite result, the three French plenipotentiaries set out for Strasbourg on the evening of April 19; but they had scarcely got beyond the gates of Rastadt when they were attacked by a number of Austrian hussars; two of the three were slain, and the third sabered, and left for dead in a ditch. The papers of the legation were carried off, but no further spoil was taken. This flagrant violation of the law of nations roused the indignation and horror not only of France, but of all Europe. The instigator and conductor of the assault were never known. Pop. '75, 12,205. Rastadt is now officially spelled *Rastatt.*

RAT, the popular name of all the larger species of the genus *mus.* See MOUSE. Two species are particularly deserving of notice, the only species found in Britain, or, indeed, in any part of Europe, and both very widely distributed over the world: the BLACK RAT (*M. rattus*) and the BROWN RAT (*M. decumanus*). Extremely abundant as these animals now are, their introduction into Europe—which, if at all through human agency, was unintentionally so—took place within recent times. Neither of them was known to the ancients. Both appear to be natives of the central parts of Asia, where other nearly allied species are also found. The black rat found its way to Europe about the beginning of the 16th c.; the brown rat first appeared at Astrakhan in the beginning of the 18th c., and reached Britain and the western countries of Europe about the middle of the century. The Jacobites of Britain were accustomed to delight themselves with the notion that it came with the house of Hanover, and chose to call it the *Hanoverian rat.* It also received the name of *Norway rat,* from a belief, unquestionably erroneous, that it was introduced from Norway, a country which it did not reach until long after it was fully established in Britain.

These two species are like one another, and very similar in their habits. The brown rat is the larger and more powerful of the two, and has waged war against the other with such success as to cause its total, or almost total, disappearance from many places where it was once very abundant; so that in many parts of Britain, where the black rat was once plentiful and troublesome, it would now be difficult, perhaps impossible, to obtain a single specimen. Rats, when pressed by hunger, do not scruple to devour the weaker even of their own kind. The extirpation of the black rat does not, however, always follow from the introduction of the brown rat, each probably finding situations more particularly suited to itself. In their native regions, they exist altogether; and in some parts of Europe the black rat is still the more plentiful of the two. Both infest ships, and are thus conveyed to the most distant parts of the world, some of them getting ashore at every port, and establishing new colonies, so that they are now common—and particularly the brown rat—almost wherever commerce extends.

The black rat is nearly 7½ in. in length, exclusive of the tail, which is almost 8 in. long. The brown rat attains a length of more than 10½ in., with a tail little more than 8 in. long. Besides its larger size and comparative shortness of tail, it differs from the black rat in its smaller ears and less acute muzzle, as well as in its lighter color and shorter hair. The tails of both are covered with a multitude of rings of small scales.

Both species are extremely prolific, breeding at a very early age, several times in a year, and producing from 10 to 14 at a birth. The excessive increase of their numbers, where abundant food is to be found, and there are few enemies to interfere with them, is thus easily accounted for. They sometimes multiply amazingly in ships; and perhaps nowhere more than in the sewers of towns. But in the latter situation, they really render good service to the promotion of public health, acting as scavengers, and devouring animal and vegetable substances, the putrefaction of which would otherwise be productive of pestilence. Such, indeed, seems to be the great use of the rat in the economy of nature; and it is perhaps worthy of notice, that the visits of the plague to western Europe and to Britain have ceased from the very time when rats became plentiful. The brown rat, inhabiting sewers, is generally larger, fiercer, and of coarser appearance than the same species in houses or barns. Rats are also often found inhabiting burrows in dry banks, near rivers, etc. They feed indiscriminately on almost any kind of animal or vegetable food; they make depredations in fields of grain and pulse, from which they often carry off large quantities to be stored in their holes; they devour eggs; they kill poultry, partridges, etc.; they make most unwelcome visits to dairies and store-closets; and they multiply enormously in the vicinity of slaughter-houses and knackers' yards, which afford them great supplies of food. Their strong rodent teeth enable them to gnaw very hard substances, such as wood and ivory, either for food, or in order to make their way to more tempting viands.

They are creatures of no little intelligence. Many curious stories are told of the arts which they employ to attain desired objects, of the readiness with which they detect the approach of danger, and the skill with which they avoid it. Their sense of smell is very acute, and the professional rat-catcher is very careful that the smell of his hands shall not be perceived on the trap. They are very capable of being tamed, and have in some instances proved interesting pets.

The flesh of rats is eaten, but only by rude tribes, or when food is scarce. The skin is used for making a fine kind of glove-leather.

The name rat is often popularly given, not only to species nearly allied to these, but to other species of *muridæ*, now ranked in different genera, some of which are noticed in other articles.

RAT, Water. See Vole.

RATAFI'A, the generic name of a series of cordials, prepared usually by mixing an an alcoholic liquor with the juice of some fruit or some flavoring material, and sugar or syrup. The name is of French origin, and is said to have been given in consequence of the former habit of preparing a choice drink to be used at the ceremony of *ratifying* a treaty. A favorite flavoring for ratafias is the almond—hence, bitter almonds, cherry, peach, apricot, plum, and other similar kernels, are much used, and hence small almond-flavored cakes are called ratafia cakes; but many other flavors are used, as orange flowers, gooseberries, raspberries, aniseed, angelica stalks; chocolate; black currants, coffee, etc.

RATCH, or Ratchet, in machinery, is a small piece of metal, so placed with one end on a pivot that the other can fall into the teeth of a wheel. Being perfectly free to move up and down, its own weight makes it drop into tooth after tooth as the wheel revolves. But, from the peculiar shape of the teeth, which have the form of an inclined plane on one side, and a perpendicular face on the other, the wheel can only revolve in one direction.

RATE, or Assessment, is a money payment levied upon the owners or occupiers of real property, in respect of some benefit to such property, or in discharge of some legal liability attaching to it. The power of rating proprietors or tenants of lands is a power not existing by the common law of England, except for the repair of the parish church or of the parish highways; for poor rates, county rates, etc., are all authorized by some statute or statutes. A rate is in the nature of a local tax, and therefore so far contrary to the law, that clear authority must always be shown for levying it. Hence, whenever a statute prescribes the conditions under which a rate may be imposed, it invariably states by whom the rate is to be made, and how it is to be enforced, and what appeal is to be allowed in case of an individual being aggrieved. These conditions must all be strictly complied with to the letter, otherwise the party rated can raise objections, and resist the rate. It may be said to be a general rule, that all rates must be so entitled that the parties rated are informed even by its heading whence the authority is derived. It is almost an invariable rule that the payment of rates is enforced in a summary way by justices of the peace, and this is one of the chief functions performed by justices. The mode in which this is practically done is by the party who has power to rate, or the agent or collector, applying to the justices for a summons, callling on the rate-payer to pay it. If payment is refused or neglected, application is next made for a distress-warrant to enforce payment, which means, if the payment is not made forthwith, or within a short specified time, the constable may seize the goods and chattels of the rate payer, and sell them to make up the amount; and if there are no goods to seize, the party may be imprisoned for a specified time. As a general rule, imprisonment is only allowed after all means of recovering the rate by distress or seizure of the goods have failed. Owing to the strictness with which the machinery of rating must be carried on as directed by the statute, the ingenuity of the rate-payers, whetted by the natural indisposition of mankind to pay taxes, constantly prompts them to detect flaws in the proceedings, and litigation in various shapes is thereby produced throughout the country. As a new rate is almost invariably made every year, and sometimes every half year, constant opportunities for displaying this spirit of resistance are afforded.

RA'TEL, *Mellivora*, a genus of quadrupeds of the bear family, *ursidæ*, nearly allied to the gluttons (q.v.), from which it differs in having one false molar less in each jaw, and the upper tubercular teeth slightly developed. The general aspect is similar to that of the badgers, but heavier and more clumsy. Two species are known, one of which, the Cape Ratel (*M. ratel* or *Capensis*), inhabits the s. of Africa, and is said to feed much on bees and their honey, its thick fur protecting it against their stings; the other inhabits the n. of India, prowls about by night, is a voracious devourer of animal food, and often scratches up recently interred bodies from their graves. The Cape ratel is about the size of a badger; gray above, black below. It is easily tamed, and is amusingly active in confinement, continually running about its cage, and tumbling strange somersaults to attract the attention of spectators, from which it seems to derive great pleasure.

RATEL-I-COUM, a Turkish sweetmeat, which has become common in confectioners' shops under several names, but chiefly that of "lumps of delight." Its composition is starch and syrup, sometimes colored. It is imported in the form of small cakes, about an inch thich, and 1 or 2 in. square, and evidently cut from a mass. These pieces have been sprinkled with powdered white sugar, to prevent them from sticking together in the small boxes in which they are packed.

RA'THENAU, or RATHENOW, a t. of Prussia, in the province of Brandenburg, on the right bank of the Havel (here crossed by a stone bridge), 45 m. w.n.w. of Berlin. It consists of two portions, one old, and surrounded by walls, and the other new. Weaving, spinning, and brick and tile making are carried on, and there are three factories for making optical instruments. Pop. '72, 8,500.

RATHKEALE', a market and post t. of the co. of Limerick, Ireland, situated on the river Deel, 17 m. s.w. of Limerick. Rathkeale is a place of some inland commerce. but possesses no manufactures of any note. It is remarkable as a chief center of the palatine settlers introduced into Ireland soon after the close of the Jacobite war. Several of the families still remain in the district. The pop. in 1861 numbered 2,761, and in '71 had decreased to 2,517.

RATHLIN', ISLAND OF, an island 6½ m. in length by 1½ in breadth, in the barony of Carey, co. of Antrim, Ireland, 6½ m. distant from the coast of Ballycastle, lat. 54° 36' n., long. 9° 15' w., supposed to be the Ricinia of Ptolemy, and Ricnia of Pliny, and called variously by later writers Rachri, Raghlin, and Ragheren, or Ragh Erin, fortress of Ireland. Rathlin has been known in history since the days of the first religious migrations of the Irish monks under Columba; it was the scene of more than one struggle in the Danish wars, and it afforded shelter, after his defeat in Scotland, to Robert Bruce. In 1558 the Scottish colony which then inhabited the island was attacked by the lord-deputy Sussex, and expelled from the island with such slaughter, that in 1590 Rathlin was said to be entirely uninhabited. The geological formation of Rathlin is basalt with limestone, and on the e. side the basalt takes a columnar form, similar to that of the Giants'Causeway on the Irish and of Staffa on the Scottish shore. The soil is light, but in the sheltered valleys productive. Formerly, a considerable industry existed on the island in the manufacture of kelp; but since the cessation of that trade (see KELP) the pop., which in 1841 amounted to 1039, had, after a lapse of 30 years, been reduced to less than half that number.

RATIBOR, a t. of Prussia, in upper Silesia, stands on the left bank of the Oder, 44 m. s.s.e. of Oppeln. It is a growing town, and a station on the Breslau and Vienna railway. Pop. '75, 17,269, who are employed in the grain and timber trade and in the manufacture of tobacco.

RATIFICA'TION is a legal term used in the law of Scotland to denote the acknowledgment made by a married woman apart from her husband, and before a justice of the peace, that a deed executed by her is voluntary, and made with full knowledge of its legal effect. In this sense, the term corresponds to what is technically called in England an acknowledgment by a married woman. With regard to minors, the term is also technically used to denote the kind of confirmation or approval given by a person arrived at majority to acts done by him during minority, and which has the effect of conclusively establishing the validity of the act, which would otherwise be voidable.

RATING OF **MEN**, in the navy, signifies the grade in which the man is entered on the ship's books; as, rated a petty officer, rated an able seaman, etc.

RATINGS of **SHIPS** are classifications by which certain allowances, the complement of officers, and other arrangements are regulated. This rating is for merely official and administrative purposes, and gives no idea of the force of the ships. The classification at present is as follows: 1. Rated ships. *First-rates*—all ships carrying 110 guns and upward, or 1000 men and upward. *Second-rates*—one of the queen's yachts; all ships above 80 guns and under 110, or with crews of from 800 to 999 men. *Third-rates*—the queen's other yachts; vessels bearing the flag or pendant of any admiral-superintendent or captain-superintendent of the royal dockyards; all ships of 60 to 80 guns, or carrying 600 to 799 men. *Fourth-rates*—all frigate-built ships carrying from 410 to 600 men. *Fifth-rates*—all ships of from 300 to 400 men. *Sixth-rates*—all other ships bearing captains. 2. Sloops—comprising all vessels bearing commanders, and having the principal armament on one deck in broadside ports. 3. Gun-vessels—all vessels having commanders, and carrying their principal armament on one deck amidships. 4. All other ships and smaller vessels commanded by lieutenants.

RA'TIO See PROPORTION.

RATION, in the army and navy, is the allowance of provisions granted to each officer, non-commissioned officer, soldier, or sailor. The army ration at home is ¾ lb. of meat, and 1 lb. of bread ("best seconds") if in barracks, or ¾ lb. of meat with 1¼ lbs. of bread if in camp. If a grocery ration is also issued, 1½d. for each such ration is deducted from the pay of the recipient. When men are not supplied with rations, an allowance of 6d. per diem is granted. Abroad, the ration is 1 lb. of bread, or ¾ lb. of biscuit, and 1 lb. of fresh or salt meat, except at certain stations, where, for climatic reasons, a different ration is specially provided. The bread ration may be increased during operations in the field, though not above 1½ lbs. of bread or 1 lb. of biscuit. During active operations, the officer commanding may direct the issue, in addition to the above, of wine, spirits, or any other article of subsistence equivalent thereto. The stoppage for this foreign ration is 1d. The families of soldiers accompanying them abroad are allowed the following rations: the wife (married under regulation), half a ration; each legitimate child under 7, a quarter ration; from 7 to 14, a third part of a ration. When officers receive a colonial allowance in lieu of rations in kind, each is subjected to a daily stoppage of 2½d. A ration of forage at home consists of 10 lbs. of oats, 12 lbs. of hay, and 8 lbs. of straw for each horse. Cavalry soldiers receive this without stoppage; but their officers suffer a deduction of 8½d per ration. Staff officers and mounted officers of infantry provide their own forage, and are granted a pecuniary allowance of 1s. 10d. per day to enable them to do so.

The full navy ration consists of the following articles: Daily—1¼ lbs. of ship-biscuit, or 1½ lb. of soft bread, ⅛ pint of spirit, 2 oz. sugar, 1 oz. chocolate, ¼ oz. tea; 1 lb. fresh meat, and ½ lb. fresh vegetables, when these are procurable; otherwise 1 lb. salt pork, with ⅓ pint split peas, or 1 lb. of salt beef, with 9 oz. flour, ¾ oz. suet, and 1½ oz. of currants or raisins. On alternate salt-beef days—2 oz. preserved potatoes. Weekly—½ pint oatmeal, ½ oz. mustard, ¼ oz. pepper, ¼ pint vinegar.

The sailor's ration is issued free of any stoppage.

RATIONALISM (Lat. *ratio*, reason), strictly signifies that method of thought which in matters of religion not only allows the use of reason, but considers it indispensable. The term has now, however, acquired a wider meaning, and stands in opposition to *supernaturalism*, or the belief in that which either transcends, or, as others view it, contradicts, both nature and reason—as, for example, miracles. To comprehend rightly the struggle between rationalism and supernaturalism, in modern Protestant theology, one must look at it from a historical point of view. The German and Swiss divines, in maintaining their polemic against Roman Catholicism (after the original enthusiasm of the reformation had cooled down), took their stand on the absolute authority of the Bible as a purely divine book, containing no admixture of error of any kind, either in form or substance—the very vowel-points of the Hebrew (an innovation long posterior even to Christianity) being expressly held to be inspired. This, the oldest and most stringent kind of Protestant orthodoxy, gradually fell to pieces, partly on account of its unscientific character, and partly because it was demonstrated that the Bible itself put forth no pretensions to such infallibility. The first concessions to rationalism were the admissions that the biblical writers differed in regard to their style and literary merit; next (as a logical inference from the foregoing), that they exercised a certain amount of independent power in the composition of their works. But gradually other points were assailed, some of which have been surrendered, while others are still tenaciously held; as that, in matters of physical science, the sacred writers spoke according to the conceptions and beliefs prevalent in their age, and not according to any supernatural enlightenment; that, on historical points, their information might be either erroneous or defective, or both; that they might err in anything except religious doctrine or sentiment; finally, that they might err in such, too, and that the Bible is not the "word of God," but only contains that "word," which it is the province of human reason to discover, and to separate from whatever accretions of fable, myth, symbolism, or error have grown over it through the agency of man or the lapse of time. This is properly the theological rationalism of modern times, and is held in Germany, France, Holland, England, and America by many divines, who, nevertheless, look upon themselves as essentially Christian in their creed. But as most investigators that proceed so far, take yet a further step, and deny the presence of any element other than human in the Bible, or that there is any satisfactory evidence of the truth of its alleged supernaturalism, the word rationalism has, in vulgar parlance, come to be synonymous with infidelity. It may also be added that the term rationalism is also employed in a restricted sense to denote the method of substituting for the miraculous and supernatural in Scripture, something considered reasonable—e.g., the miracle of the crossing of the Red sea is explained by the hypothesis that the Israelites crossed when the tide was out, while the Egyptians, hurriedly pursuing them, were taken in the returning waters. The leader of this school was *Paulus* (q.v.), whose system, after a time, gave way to the more scientific mythical theory of Strauss (q.v.).

RA'TIOS, PRIME AND ULTIMATE. There can be little doubt that Newton discovered, by means of fluxions, of which he was in possession at a very early age, the greater part of that extraordinary series of theorems regarding motion, etc., which he first published in the *Principia*. He had, however, a great partiality for the synthetic form of demonstration, employed with such success by the Greek geometers; and the consequence was that, in the *Principia*, he avoided entirely the use of analysis by fluxions, and invented for synthetical applications the closely allied method of prime and ultimate ratios. The fundamental idea involved in fluxions, prime and ultimate ratios, and the differential calculus, is the same, that of a *limit* (q.v.).

To give an idea of the nature, as well as to show the origin of the name, of the method, we may take a very simple case. Let a particle be projected in the direction AP; it will move uniformly in that line forever, unless deflected from it by some external force. See Motion, Laws of. Suppose that gravity alone acts upon it, then (see Projectiles) it will describe a parabolic path, AQ, to which AP is the tangent at A; and the line PQ, which joins the disturbed and undisturbed positions of the particle at any instant, is vertical. Now, the lengths of AP and AQ are not, in general, equal, but they are more and more nearly equal as both are smaller; and, by taking each small enough, we may make the *percentage* of difference between them as small as we choose. In other words, their *prime ratio*, just at A, is unity. Again, the inscribed square is less than a circle; the octagon greater than the square, but less than the circle; the regular polygon of 16 sides greater than the octagon, but less than the circle; and so on, constantly doubling the number of sides. But it can be shown that the difference of area between the polygon and the circle may be made as small a percentage of the area of the circle as we please, by making the sides of the polygon numerous enough. Hence, the *ultimate ratio* of the areas of the circle, and inscribed polygon with an indefinitely great number of equal sides, is unity.

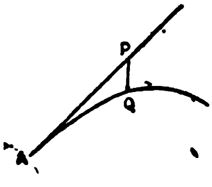


FIG. 1.

The basis of the method, which is implicitly involved in the foregoing illustrations, is Newton's *first lemma:* "Quantities, and the ratios of quantities, which tend constantly to equality, and may be made to approximate to each other by less than any assignable difference, become ultimately equal." In other words, if we can make the *percentage* of difference of two quantities as small as we choose, we must produce ultimate equality.

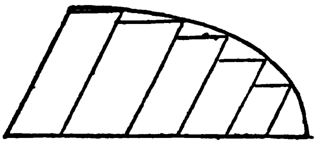


FIG. 2.

From this, in his second and third lemmas, Newton proves the fundamental principle of the integral calculus as applied to the determination of the areas of curves, by showing that if a set of parallelograms, as in the figure, be inscribed in any curvilinear space, the percentage of difference between the sum of their areas and that of the curve may be made as small as we please by diminishing indefinitely the breadth of each parallelogram, and increasing their number proportionally.

Next, he shows how to compare two curvilinear spaces, by supposing them filled with such parallelograms, each of the first bearing to one of the second a constant ratio.

Next, that the homologous sides of similar *curvilinear* figures are proportional.

The sixth lemma is merely a definition of continuous curvature in a curve, as distinguished from abrupt change of direction.

The seventh, eighth, and ninth lemmas are of very great importance. The general principle involved in their proof is this—to examine what occurs in indefinitely small arcs, by drawing a magnified representation of them such as always to be on a finite scale, however small the arcs themselves may be. Thus, to show that the chord of a small arc is ultimately equal to the arc—of which we have in trigonometry (q.v.) as a particular case, the ultimate equality of an arc and its sine—he proceeds somewhat as follows: Let AB be an arc of continued curvature, AC the tangent at A. Produce the chord AB till it has a *finite* length, A*b*. Describe on A*b*, as chord, an arc similar to AB. This, by a previous lemma, will touch AC at A. Now, as B moves up to A, let the same construction be perpetually made, then *b* will approximate more and more closely to AC (because the arc AB is one of continuous curvature), and the magnified arc will constantly lie between AC and A*b*. Hence, ultimately, when A*b* and AC coincide in direction, the arc A*b* (which is always between them) will coincide with A*b*. Similarly, AD being any line making a finite angle with AC, draw DBE cutting off a finite length from AD; this process enables us to prove that the triangles AED, and the rectilinear and curvilinear triangles ABD, are all ultimately equal.

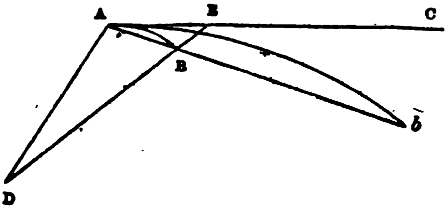


FIG. 3.

Finally (and this is the step of the greatest importance in the dynamical applications), if the lines AD, DE, D'E' be drawn under the above restrictions, the ultimate ratio of the curvilinear or rectilinear triangles AEB, AE'B' is that of the squares of corresponding sides. From this, in the ninth and last lemma, it is easily shown that the spaces described under the action of a finite force have their prime ratios as the squares of the times: whence we pass at once to the ever-memorable investigations of the *Principia* regarding the orbits described under the action of various forces.

The method of prime and ultimate ratios is little used now (except in Cambridge, which does honor to itself in making part of the *Principia* a subject of study), as the differential and integral calculus help us to the required results with far greater ease. But to the true student of natural philosophy, the synthetic method of Newton is of very great value, as it shows him clearly at every step the nature of the process he is carrying out, which is too apt to be lost sight of entirely in the semi-mechanical procedures common to all forms of symbolical reasoning.

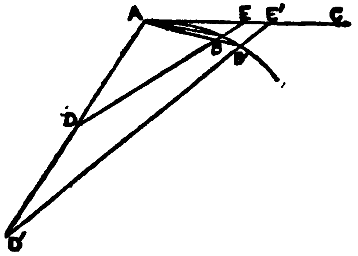


Fig. 4.

RAT'ISBON. See REGENSBURG.

RAT'LINES, or RATLINGS, are steps in the ladders by which sailors ascend from the deck to the mast-heads. They consist of thin cords fastened horizontally across the shrouds at an easy step apart, thus forming a convenient ladder. To prevent the ratline slipping, it is commonly tied to the shroud in a peculiar knot called a clove-hitch.

RAT-SNAKE, *Coryphodon Blumenbachii,* a serpent of the family *Colubridæ* (see COLUBER), which is often kept in a state of domestication in Ceylon, on account of its usefulness in killing rats. Like the rest of its family, it is destitute of poison-fangs. It is capable of being rendered very tame, and displays considerable intelligence.

RAT-TAIL MAGGOT, the larva of a dipterous insect, *eristalis tenax,* of the family *muscidæ.* It inhabits mud, and breathes by means of tubes attached in telescope fashion to the tail, which terminates in a brush of hairs, and is always held up to the surface of the water, being elongated when the depth of water increases. The perfect insect is very like a bee.

RATTAN', RATAN, or ROTTANG, *Calamus,* a genus of palms very different in habit from most of the order; having a reed-like, slender, often jointed, and extremely long stem, sometimes even 1000 ft. or upwards in length. The name rattan is extended to others of the same tribe of palms, having the same general habit, although constituted by botanists into different genera. The stem, which is very smooth, and hard and silicious externally, is either erect, or ascends and descends among trees; often laying hold as it ascends by means of hooked prickles, the extremities of the midribs of its leaves, which are scattered at considerable intervals along its whole length, and envelop it by their sheathing stalks, and then descending in graceful festoons to climb again a neighboring tree. Sometimes, however, there are no leaves scattered along the stem. Sir James E. Tennent says, in his work on Ceylon: "I have seen a specimen 250 ft. long, and an inch in diameter, without a single irregularity, and no appearance of foliage other than the bunch of feathery leaves at the extremity." The leaves are always pinnate, and very beautiful. The fruit is a dry berry, covered with imbricated scales, and generally one-seeded.

The species are very numerous, all natives of the East Indies. A few species are found in the southern parts of India; but they abound along the southern foot of the Himalayas, in Chittagong, Silhet, Assam, the s.e. of Asia, and many of the islands of that region. They are all very useful, are much employed in their native countries, for making plaited work, ropes, etc., and are very largely imported into Britain and other parts of the world, generally under the name of *cane,* and chiefly in order to be used for plaited or wicker work.—Bridges of great strength are made, in some parts of the east, of the stems of these palms. They are twisted into ropes in some parts of the east, which are used for binding wild elephants, and for other purposes requiring great strength; the vessels of Java, Sumatra, and neighboring regions are very generally furnished with cables made of them, which are extensively manufactured at Malacca; and the Chinese make ropes of rattans by splitting them longitudinally, soaking them, and attaching them to a wheel, which is kept in motion, while new rattans are added, one by one, to increase the length of the rope.—The species called *calamus rudentium,* which has very long stems, is much employed in rope-making. Many species probably furnish the canes of commerce, one of which, *C. verus,* a native of India, is only about 20 ft. in length. The elegant walking-canes called *Malacca canes* are believed to be the produce of *C. scipionum;* the plant, however, does not grow in Malacca, but in Sumatra.—Small stems of rattan are used as a substitute for whalebone in umbrellas.—The fruit of some species of rattan is a delicate article of food; and the young shoots, variously dressed, are equal to the finest of vegetables.—A very fine kind of *dragon's blood* (q.v.) is obtained from a species of rattan (*C. draco*), and particularly from the fruit, on the surface of which it appears as a resinous exudation. Various methods are employed for collecting it.

The canes of commerce are usually imported in bundles of 100 canes, each cane from 15 to 20 ft. in length; from 200,000 to 300,000 of these bundles are annually imported into Britain.

RATTANY, or RHATANY, *Krameria triandra*, a half-shrubby plant, of the natural order *polygaleæ*, a native of the cold sterile table-lands of the Andes in Peru and Bolivia. It is called *ratanhia* in Peru. It is valued for the medicinal properties of the root, which are shared more or less by other species of the same genus, also natives of South America. The dried root is a powerful astringent, and a useful tonic; and is employed in mucous discharges, passive hemorrhages, and cases of relaxation and debility. It is also used as a tooth-powder, often mixed with orris root and charcoal. Rattany root is imported from different parts of South America, but chiefly from Lima. It is extensively imported into Portugal in order to communicate a rich red color to wines. The peculiar properties of rattany root are supposed to be chiefly owing to an acid called *krameric acid*.

RATTAZZI, Princess MARIE STUDOLMINE DE SOLMS, b. London, 1830; daughter of sir Thomas Wyse, who married Lætitia, daughter of Lucien Bonaparte. After the separation of her parents, Louis Philippe placed her in a royal school at St. Denis. She was married in 1850 to Frederic Solms, a wealthy Alsatian, but was separated from him in 1852. As she could not refrain from political intrigues, Napoleon III. objected to her residing in Paris, and she lived till 1860 in Savoy and Nice, devoting herself to literary pursuits under the name of Princess Marie de Solms. In 1860 she married Urbano Rattazzi, an Italian statesman, whose memoirs she has recently published. She is the author of many poems and dramas, and has edited several journals. Among her many novels, *Les Mariages de la Créole* and *Si j'étais Reine* are the most popular.

RATTAZZI, URBANO, an Italian statesman, was b. in the middle ranks of life, at Alessandria (Piedmont), in 1810. He was an advocate at Casale, where, in 1847, he was president of the agricultural committee. After the proclamation of the constitution in 1848, he was elected member for Alessandria, and began his political career as a democrat. His knowledge, eloquence, and liberal principles raised him to the ministry, and his first act was to write to the bishops, threatening to have them arrested if they should preach against liberty. He resisted his chief, Gioberti, who wished to send Piedmontese soldiers into Tuscany and Rome, to prevent the occupation of these places by the Austrians and French; urged Charles Albert into a new war with Austria, and after the defeat of Novara, was obliged to retire from the ministry. After Napoleon's *coup d'état*, the liberty of Piedmont was threatened, and Cavour, Rattazzi, and their parties joined together to defend it. This union was called *connubio*. Rattazzi took the portfolio of minister of justice in the Cavour ministry in 1854, and presented the bill for the abolition of convents. The priests were up in arms against him, and he was strenuously opposed by the Catholic party. After the Mazzinian movement in 1857, being accused of weakness in suppressing it, he retired. After the peace of Villafranca, he returned to the ministry. He did not wish to accept definitively the annexation of the duchies, because he knew that the price of it was Savoy and Nice, which he was unwilling to give up; and being, as is alleged, secretly undermined by Cavour and sir James Hudson, he fell. In 1862 Rattazzi was intrusted with the formation of a new ministry. His policy was an attempt to secure the development of Italian liberty and unity by peaceful and diplomatic means. He opposed Garibaldi's expedition against Rome in that year, so that its result was the disaster at Aspromonte. His ministry failed to secure the confidence of parliament, and he accordingly resigned at the end of the year 1862. He returned to office in 1867, but had to resign the same year. He died June 5, 1873.

RATTLESNAKE, *Crotalus*, a genus of serpents of the family *crotalidæ*, distinguished from the rest of that family by the rattle at the end of the tail. They are also characterized by having only one row of plates under the tail. The genus is subdivided by many authors according to the scales and shields with which the head is covered in different species. All the species are American, and are much dreaded for their deadly venom, although they seldom assail man, unless molested, and the rattle often gives timely warning of danger. The rattlesnake is often found at rest in a coiled form, with the rattle somewhat erected from the center of the coil: and when it begins to be irritated, the rattle shakes. Rattlesnakes are generally rather sluggish in their movements, but they are most active and most dangerous in the warmest weather, their bite being more formidable at such a time, as well as more readily inflicted. The effects of the bite are various, according not only to the condition of the serpent, but also according to the constitution of the person bitten, and the place into which the fangs have been inserted, the worst case being when the poison immediately enters a large vein, and so is carried at once to the most vital parts. Death to human beings has been known to ensue in a few minutes, while in other cases, hours or days have elapsed, and sometimes the sufferer recovers. Almost all animals show what may be deemed an instinctive dread of the rattlesnake, and a great unwillingness to approach it. Hogs and peccaries, however, are so far from regarding it with dread, that they kill and eat it, finding safety from its venom probably not in any peculiarity of constitution, but in their thickness of skin, and the thickness of the layer of fat under the skin. Rattlesnakes are viviparous, and exhibit attachment to their young. It is said of them, as of the viper, that on the appearance of danger, the mother receives her young ones into her mouth and gullet, or stomach, ejecting them again uninjured when the danger is past, but the same doubt attaches to the story as in the case of the viper. The power of fascination (q.v.) has not been more frequently ascribed to any kind of serpent.

The rattle is a very peculiar appendage. It consists of a number of thin horny cells, jointed together; each, except the terminal one, of a conical form, and in great part covered by that next to it, against the sides of which its apex strikes when the rattle is shaken, so as to produce a rustling or rattling noise. It is generally believed that the number of joints in the rattle increases with the age of the serpent, one being added at each casting of the skin. One species of rattlesnake (*crotalus horridus*), sometimes called the CARCAVELA, is found in the warm parts both of North and South America. Its muzzle is covered by three or four pairs of plates. Its scales have a sharp elevated keel. It attains the length of 8 ft., although it is seldom found of so great a size. Its color is yellowish-brown above, with a broad dark streak on each side of the neck, and a series of broad lozenge-shaped spots on the back.—Another species, *crotalus* or *uropsophus, durissus*, extends further northward as far as the southern shores of the great lakes. It is of a pale brown color, with a dark streak across the temples, and dark spots on the body, often assuming the form of bands; the keel of the scales not so strongly developed, and the muzzle with fewer shields than in the former species, which it resembles in size. A third species, *crotalus* or *crotalophorus miliaris*, having the head completely covered with large shields, is also common in many parts of North America, and is as much dreaded as either of those already named, notwithstanding its much smaller size, because the sound of its rattle is so feeble as not readily to attract attention. It is of a brownish-olive color, with brown spots on the back and sides, the belly black.—In the colder countries which they inhabit, rattlesnakes spend the winter in a torpid state, retiring for that purpose into holes, or hiding themselves among moss.

RATZ BOSZORMENY. See BÖSZORMENY.

RAUCH, CHRISTIAN DANIEL, one of the most distinguished German sculptors, was b. at Arolsen, the capital of the principality of Waldeck, in 1777. He early began the study of sculpture; but on the death of his father, in 1797, he was obliged to go to Berlin, where he became valet to Frederick William II., king of Prussia. On the death of that prince, Rauch determined to follow the bent of his inclination for the fine arts. In this he was assisted by the new king Frederick William III., who afforded him facilities for designing and modeling statues, and recommended him as a pupil in the academy of the fine arts. A statue of Endymion and a bust of queen Louise of Prussia executed at this time, convinced the king of Rauch's abilities, and he gave him the means of proceeding to Rome for his further improvement. Rauch spent six years in that city, working at his profession with much assiduity to render himself worthy of the friendship of Thorwaldsen and Canova. At Rome he also enjoyed the friendship of William Humboldt, at that time Prussian minister there.

Among his works at this time were bassi-rilievi of "Hippolytus and Phædra," a "Mars and Venus wounded by Diomedes," a colossal bust of the king of Prussia, and busts of Raphael Mengs and the count de Wengersky. In 1811 he was called by the king of Prussia to Berlin to execute a monumental statue of queen Louise. This great work obtained for Rauch a European reputation. It is placed in the mausoleum of the queen in the garden of Charlottenburg. Rauch was not, however, quite satisfied with this triumph of his art, but commenced a new statue of the queen, which he finished 11 years afterward, and which is allowed to be a masterpiece of sculpture. It is placed in the palace of Sans Souci, near Potsdam. Rauch, after this, lived principally at Berlin, but occasionally visited Rome, Carrara, and Munich. He labored indefatigably in his profession, and by 1824 had executed 70 busts in marble, of which 20 were of colossal size.

Rauch's principal works, besides those above mentioned, are: two colossal bronze statues of field-marshal Blücher, one of which was erected, with great solemnity, at Breslau in 1827; a bronze statue of Maximilian of Bavaria, erected at Munich in 1835; and statues of Albert Dürer, Goethe, Schiller, and Schleiermacher, erected in various places in Germany. His greatest work is the magnificent monument of Frederick the great, which adorns Berlin. The model for this statue was designed by Rauch in conjunction with prof. Schinkel, the architect, in 1830; and after 20 years' labor the statue was finished in 1850, and was inaugurated with great pomp in May, 1851.

In his works Rauch has the merit of having surmounted the difficulties which modern costume opposes to the ideal representation of personages of the present age; and, while he preserved the salient points of his model, he possessed the art of sacrificing the less important details to the exigencies of the beautiful. He died at Dresden on Dec. 3, 1857.

RAUCH, FRIEDRICH AUGUST, D.D., 1806–41; b. Germany. He studied at the university of Marburg, afterward at Giessen and Heidelberg. After holding a professorship at Giessen and then at Heidelberg for a short time, he sailed for America in 1831, as the government objected to the free expression of his political opinions. In 1882 he was ordained to the ministry, and placed in charge of the classical school at York, Penn., connected with the theological seminary of the German Reformed church. In 1835 he was appointed president of Marshall college, where he died in 1841. He wrote *Psychology, or a View of the Human Soul,* and left an uncompleted work on *Christian Ethics.*

RAU'HÉS HAUS is the name of a great institution founded and hitherto managed by Wichern at Horn, near Hamburg, in connection with the German home-mission (*innere mission*). It is partly a refuge for morally neglected children; partly a boarding-school for the moral and intellectual education of children of the higher classes; lastly, a training-school for those who wish to become teachers or officials in houses of correction, hospitals, etc., in promotion of the objects of the home-mission. The first foundation of this model institution—for such it has become for Germany as well as for France—was laid by a wealthy citizen of Hamburg, who made over to it a piece of land. It was opened on Nov. 1, 1831, by Wichern with 12 morally neglected children. By the addition of new houses the whole has, however, been very much enlarged, and has of late almost grown into a colony. A printing-office, a bookbinder's shop, and bookselling form part of the institution. Recently about 100 neglected children (one-third are girls) receive their education in the establishment. They live in families of 12, each family being under the paternal superintendence of a young artisan, who employs the children according to their capabilities, partly in indoor, partly in outdoor, manual labor. The watching and care of these children devolve on assistants, who also take part in the instruction of the institution, with a view to prepare themselves for the work of the home-mission in other institutions. These instructors receive board and clothing, but no salary. In connection with the Rauhés Haus there was founded in 1845 a kind of conventual institute for the education of young men with a view to become heads or superintendents of similar institutions. Entrance into this institution is limited to the age of 20—30. Besides religious belief and good character, freedom from military duties, bodily and mental health, some scholastic acquirements, and a knowledge of some craft or of agriculture, are required. The boarding-school was established in 1851, and at the same time a seminary was founded, in which 12 brethren of the Rauhés Haus are especially prepared for school-work.

RAUMER, FRIED. LUDW. GEORG VON, a noted German historical writer, was b. on May 14, 1781, in Wörlitz, near Dessau; studied law and political economy at Halle and Göttingen; filled different law appointments (1806–11); and in the last-mentioned year was named professor at Breslau. In 1819 he was called to Berlin as professor of history and political economy. Among his writings may be mentioned: *Sechs Dialoge über Krieg und Handel* (1806); *Das Brittische Besteuerungssystem* (Berl., 1810); *The Orations of Æschines and Demosthenes de Corona* (Berl. 1811); *CCI. Emendationes ud Tubulas Genealogicas Arabum et Turcarum* (Heidelb., 1811); *Handbuch merkwürdiger Stellen aus den Lat. Geschichtschreibern des Mittelalters* (Handbook of Remarkable Passages in the Latin Historians of the Middle Ages, Bresl. 1813); *Vorlesungen über die alte Geschichte* (Lectures on Ancient History, 2 vols., Leip. 1847); *Geschichte der Hohenstaufen und ihrer Zeit* (History of the Hohenstaufen Dynasty and their Time, 6 vols., Leip. 1823–25); *Ueber die geschichtliche Entwickelung der Begriffe von Recht Staat und Politik* (On the Historical Development of the Ideas of Law, State, and Politics, 2d ed., Leip. 1832); *Prussian Municipal Law* (Leip. 1828); *Briefe aus Paris und Frankreich*, 1830 (2 vols., Leip. 1831); *Briefe aus Paris zur Erläuterung des Geschichte des* 16*th und* 17*th Jahrh.* (2 vols., Leip. 1831); *Geschichte Europas seit dem Ende des* 15 *Jahrh.* (History of Europe from the End of the 15th Century, vols. 1–8, Leip., 1832–50); *England*, 1835 (2 vols., Leip., 1836); *England*, 1841 (3 vols., Leip. 1842); *Beiträge zur Neuern Geschichte aus dem Brit. Museum, etc.* (5 vols., Leip. 1836–39); *Italie: Beiträge zur Kenntnissdies es Landes* (2 vols., Leip. 1840); *Die Vereinigten Staaten Von Nordamerika* (2 vols., Leip. 1845); *Antiquarische Briefe* (Leip. 1851); *Handbuch zur Geschichte der Literatur* (1864–66). He also edited the *Historisches Taschenbuch*, etc. The unfavorable reception of an oration of Raumer in honor of king Frederick II. compelled him, in 1847, to resign the secretaryship of the academy of sciences at Berlin. Raumer was a member of the Frankfort parliament, where he belonged to the right center. Subsequently he became ambassador at Paris, and then member of the first chamber at Berlin. In 1853 he became professor emeritus at the university of Berlin. He died in June, 1873.

RAUMER, KARL GEORG VON, brother of the preceding, was b. April 9, 1783, in Wörlitz; studied from 1801 to 1805 at Göttingen and Halle, then at the mining academy at Freiberg, and was appointed professor of mineralogy at Breslau university in 1811. He took part as a volunteer in the war of liberation (1813–14), was translated in 1819 to the university of Halle; and finally, in 1827, was appointed professor of mineralogy and natural history in the university of Erlangen, where he died in 1865. Raumer obtained a wide reputation by his geographical and geological writings, among which are *Geognostische Fragmente* (Geognostic Fragments, Nürnb. 1811); *Der Granit des Riesengebirges* (The Granite of the Riesengebirge, Berl. 1813); *Das Gebirge Niederschlesiens* (The Mountains of Lower Silesia, Berl. 1819); *A B C Buch der Krystallkunde* (The A B C of Crystallography, 2 vols., Berl. 1817; supplem. 1821). His interest in literary and scholastic education is evinced in his valuable *Geschichte der Pädagogik* (History of Pedagogy, 4 vols., Stuttg. 1846–55). Other works are his *Lehrbuch der allgemeinen Geographie* (Manual of Universal Geography, Leip. 1848); *Palestine* (Leip. 1850); *Beschreibung der Erdoberfläche* (Description of the Earth's Surface, 6th ed., 1866); and *Kreuzzüge* (1840–64). His autobiography appeared after his death, 1866.

RAUPACH, Ernst Benj. Sal., a German dramatist, b. on May 21, 1784, in Straubitz (Silesia); received his education in the gymnasium at Leignitz; studied theology at Halle, was for ten years tutor in Russia, held lectures at St. Petersburg university, and was subsequently (1816) appointed there professor of philosophy, German literature and history. Raupach left Russia in 1822, and died at Berlin, Mar. 18, 1852. Among his early plays the following are noteworthy: *The Princes Chawansky* (1818); *Die Gefesselten* (The Enchained, 1821); *Der Liebe Zauberkreis* (The Magic Ring of Love, 1824); *Die Freunde* (The Friends, 1825); *Isidor und Olga* (1826); *Rafaele* (1828); *Die Tochter der Luft* (The Daughter of the Air), after Calderon (1829). Among his comedies may be mentioned: *Critic and Anticritic; Die Schleichhändler* (The Smugglers); *Der Zeitgeist* (The Spirit of the Time); *Das Sonnett;* and the farces, *Denk an Cäsar* (Remember Cæsar) and *Schelle im Monde.* Of his posthumous works, the principal are: *Jacobine von Holland* (1852); *Der Kegelspieler* (The Player at Nine-pins); the tragi-comedy, *Mulier tacat in Ecclesia* (1853); and *Seed and Fruit* (1854). Raupach's writings display great knowledge of stage effect, a happy talent for the invention of new and interesting situations, a power of vivid dramatic diction, and a fine play of verbal wit.

RAUSCHER, Joseph Othmar von, 1797–1875; b. Vienna; studied law; abandoned it for theology; ordained priest in 1823; vicar at Hütteldorf; professor of canon law and church history at Salzburg; in 1832 director of the Oriental academy at Vienna; subsequently filled various offices, one of which was that of instructor of the present emperor and his brothers. In 1849 he was appointed bishop of Seckau, and in 1853 was raised by the emperor to the archiepiscopal see. In this position he was appointed by the emperor to negotiate a concordat between Austria and the Roman see. For this he was made cardinal the same year.

RAVAILLAC, François, a native of the French province of Angoulême, where he was b. in 1578, has acquired an obnoxious reputation as the murderer of Henri IV. of France. In early life Ravaillac was in turn clerk to a notary and master of a school; but having fallen into debt, he was thrown into prison, the confinement and restraint of which preyed upon his health, and produced hallucinations of mind. Under the influence of this mental excitement, he renounced all secular pursuits; and on his release from prison, after having served for a time in the order of the Feuillants, he fell under the influence of the Jesuits, through whose instrumentality it is believed that his insane hatred of the Huguenots, as the enemies of the church, was directed more especially against Henri of Navarre, their former leader. Having resolved to assassinate the king, he eagerly watched his opportunity, and on May 14, 1610, as the king was passing in his coach through the narrow street of Laferronnerie, got upon the right hinder-wheel of the carriage at the moment that its further advance was hindered by a heavy wagon in front of it, and leaning forward, he plunged a knife into the breast of the king. The first blow glanced aside, but at the second thrust the knife entered the heart. Ravaillac escaped in the confusion, but being soon captured with the knife still in his hand, he admitted his guilt; and having been formally tried and condemned, he was put to the torture; and suffered death on May 27, in the Place de Grève, under circumstances of great cruelty, his body being torn asunder by horses. Ravaillac refused to the last to acknowledge whether he had had instigators or abettors, and hence the widest scope was given to conjecture, suspicion being in turn directed to the queen, Marie de' Medici, and her favorites, the Concini, to the duc d'Epernon, and to the Spanish court and their Jesuit advisers, but there is no good ground for such suspicions. M. Henri Martin (*Histoire de France*) and M. Poirson (*Histoire de Henri IV., tome II.*) have examined the particulars of the process instituted against Ravaillac with scrupulous impartiality, and have come to the conclusion that the real cause of the crime was fanaticism degenerated into monomania.

RÂVAN'A (from the causal of the Sanskrit *ru*, cry, alarm, hence literally he who causes alarm) is the name of the *Rákshasa* (q.v.) who, at the time of Râma, ruled over Lankâ or Ceylon, and having carried off Sîtâ, the wife of Râma, to his residence, was ultimately conquered and slain by the latter. Râvan'a is described as having been a giant with ten faces, and in consequence of austerities and devotion, as having obtained from S'iva a promise which bestowed upon him illimited power, even over the gods. As the promise of S'iva could not be revoked, Vishn'u evaded its efficacy in becoming incarnate as Râma, and hence killed the demon-giant. See under Vishn'u and Râkshasa.

RA'VELIN, in fortification, is a triangular work of less elevation than the main defenses, situated with its salient angle to the front before the curtain, which with the shoulders of the adjoining bastions it serves to protect. It is open at the rear, so as to be commanded by the curtain, if taken, and is separated from that work by the main ditch, while in its own front the ditch of the ravelin intervenes between itself and the covert-way. The guns of the ravelin sweep the glacis, and perform a very important function in commanding the space immediately before the salient angles of the two next bastions, ground which the guns of the bastions themselves cannot cover. The bastions, on the other hand, flank the ravelin. In the fortifications of Alessandria, designed by Bousmard in 1803, the ravelins are placed in front of the glacis.

The original name of the ravelin was *rivellino*, which indicates a derivation from *vegliare*, to watch, the ravelin having probably been at first a watch-tower, answering to the still earlier barbacan.

RAVEN, *Corvus corax*, a species of crow (q.v.), remarkable for its large size. It is more than 2 ft. in length from the tip of the bill to the extremity of the tail. The bill is thick and strong, compressed at the sides, the mandibles sharp at the edges; the upper mandible curved at the tip, and exceeding the lower in length. The base of the bill is surrounded with feathers and bristles. The tail is rounded, but the middle feathers are considerably the longest. The wings are long—extending from tip to tip to 52 in.—the fourth quill-feather being longest. The color is a uniform black, with more or less of metallic luster, which is particularly conspicuous in the elongated throat-feathers of the male, and is wanting in the whole plumage of the female and young.

The raven is a bird of wide geographic distribution. It is found in almost all parts of the northern hemisphere, but most abundantly in the more northern and the mountainous parts of it. In other parts of the world, and within the northern hemisphere itself, however, other closely allied species have probably been often mistaken for it. There are several species of crow very similar to the raven in color, size, and habits.

The raven is generally to be seen either solitary or in pairs. It is one of the most thoroughly omnivorous of birds. It feeds on fruits and nuts in forests; it picks up worms or mollusks; it sucks eggs; it kills young hares, or even lambs; it rejoices in carrion, and not unfrequently attacks weak or sickly beasts, almost invariably choosing their eyes as its first point of assault. It generally makes its nest of sticks, coarse weeds, wool, hair, etc., in rocky places, on a narrow ledge of a precipice, or in some similar situation. Ravens are occasionally captured when young, and become interesting pets, being remarkable for their impudence and cunning, their look of sage thoughtfulness, their inquisitiveness, their mischievous propensities, which prompt them to destroy everything that can be destroyed, and always as if the fact of its destruction afforded them pleasure, their thievishness, their love of glittering things, and their power of imitating human speech, which is almost equal to that of parrots. The raven is celebrated for its longevity, and instances are on record of ravens which have certainly lived for 70 or 80 years. The raven has been generally reckoned a bird of ill-omen, probably on account both of its color and its extremely harsh croaking voice, which may sometimes be heard in fine weather as if coming from the sky, the raven being a bird of powerful wing, and often soaring very high in the air.

RAVENNA, a province of n. Italy, in the compartment of Emilia; having Ferrara on the n., Bologna and Tuscany on the w., Forli on the s., and the Adriatic sea or gulf of Venice on the e.; 742 sq.m.: pop. 221,115. Its surface in the e. is low and marshy; in the w. and at the foot of the Apennines it is more elevated, having a soil well under cultivation, producing corn and hemp. Cattle are raised, and salt is made from the lagoon of Cervia. It is drained by the Santerno, the Senio, the Lamone, the Montone, and the Ronco rivers, and has a canal connecting its capital with the Adriatic. It is traversed by a highway from Faenza, one of its chief cities, across the Apennines into the valley of the Sieve. The products of the leading manufactures are silk, wine, oil, and cream of tartar. Capital, Ravenna.

RAVEN'NA, an important city of central Italy, 43 m. e.s.e. from Bologna, and 4½ m. from the Adriatic; lat. 44° 24′ n., long. 12° 12′ east. Pop. '72, of the commune, 58,904; of the town proper, 21,000. It is situated in the midst of a well-watered, fertile, and finely-wooded plain. Ravenna is surrounded by old bastions, and by walls where may still be seen the iron rings to which the cables of ships were formerly fastened; the sea is now at the distance of about 4 m. from the city. The streets are wide; the squares are adorned with statues of the popes, and the houses have a gloomy appearance. Ravenna is an ancient city, rich in monuments of art. The cathedral, built in the 4th c., was almost wholly rebuilt in 1734; it has 5 naves, supported by 24 marble pillars. Of the other 14 churches and other architectural antiquities several date from the 5th and 6th centuries. San Francesco possesses the tomb of Dante, erected in the 15th century. The library of Ravenna contains 50,000 volumes. It has an archæological museum, and many educational institutions. Ravenna has manufactures of silk, and its trade is facilitated by a canal to the sea.

Ravenna was probably of Umbrian origin; it was at least an Umbrian city when it passed into the hands of the Romans. Augustus made it a first-class seaport and naval station; 400 years later, the emperor Honorius took refuge there, and made Ravenna the capital of the empire. The city was taken by Odoacer, then by Theodoric and by Totila; the latter was conquered by Narses, who made it the residence of the exarchs in 553. In 1218 it became a republic. In 1275, Guido da Polenta conquered it, and there established his court, where he received Dante. Ravenna was afterward taken by the Venetians, who kept it till 1509. Under Charles V. it passed into the hands of the popes.

Under the walls of Ravenna, a great battle was fought in 1512 between the French and the Spaniards, in which Gaston de Foix purchased victory with his life.

RA'VENSBURG, a t. in Würtemberg, and capital of a bailiwick of the same name, in the circle of the Danube, is pleasantly situated in a fertile and romantic valley, the Schussenthal, at the foot of a hill planted with vines. The principal industries are spinning wool and flax, weaving woolen fabrics, linen, and stockings, bleaching, making paper, playing-cards, furniture, wood-work, sawing wood, etc. Pop. '75, 10,034.

RAVENSCROFT, Thomas, an eminent English musical composer. He was b. in 1592, received his musical education in St. Paul's choir, and had the degree of bachelor of music conferred on him when only 15 years of age. In 1611 appeared his *Melismata, Musical Phansies, etc.*, a collection of 23 part-songs, some of them of great beauty; and three years later he brought out another collection of part-songs under the title of *Brief Discourses*, with an essay on the old musical modes. Turning his attention to psalmody, he published, in 1621, a collection of psalm-tunes for four voices, entitled *The Whole Book of Psalms, composed into Four Parts by Sundry Authors to such Tunes as have been and are usually sung in England, Scotland, Wales, Germany, Italy, France, and the Netherlands.* This was the first publication of its kind, and all similar works of later date have been largely indebted to it. Among the contributors to this collection were Tallis, Morley, Dowland, and all the great masters of the day; the name of John Milton, the father of the poet, appears as the composer of York and Norwich tunes; while St. Davids, Canterbury, Bangor, and many others which have since became popular, are by Ravenscroft himself. Each of the 150 psalms has a distinct melody assigned it. Two collections of secular songs similar to the *Melismata*, and entitled *Pammelia* and *Deuteromelia*, have been assigned to Ravenscroft; but it is probable that only a few of these songs were composed by him, while he may have revised and edited the whole. A selection from the *Melismata*, *Brief Discourses*, *Pammelia*, and *Deuteromelia* was printed by the Roxburghe club in 1823. Ravenscroft died about 1640.

RAVIGNAN, Gustavus Francis Xavier Delacroix de, a celebrated preacher of the Jesuit order, was b. at Bayonne, Dec. 2, 1795. He studied in the Lycée Bonaparte at Paris, and having embraced the legal profession, and obtained his degree, was named auditor of the Cour Royale at Paris, and afterward, in 1821, received an appointment in the tribunal of the Seine. The prospect thus opened for him, however, soon lost its attraction, and in 1822 he formed the resolution of relinquishing his career at the bar, and entering the church. Having spent some time in the college of St. Sulpice, he soon passed into the novitiate of the Jesuits at Montrouge, and thence to Dole and St. Acheul for his theological studies, at the termination of which he was himself appointed a professor. On the expulsion of the Jesuits from France, in 1830, Ravignan withdrew to Freiburg in Switzerland, where he continued to teach in the schools of his own order; but after some time he was transferred to the more congenial duty of preaching, first in several of the Swiss towns, and afterward in Savoy, at Chambery, at St. Maurice, and other places. At length, in 1835, he appeared in the pulpit of the cathedral of Amiens. In the following year he was chosen to preach the Lenten sermons at the church of St. Thomas d'Aquin in Paris; and finally, in 1837, was selected to replace Lacordaire (q.v.) at Notre Dame, in the duty of conducting the special "conferences" for men which had been opened in that church. For ten years Père de Ravignan occupied this pulpit with a success which has rarely been equaled, and his "conferences" are regarded as models of ecclesiastical eloquence. In 1842 he undertook in addition to preach each evening during the entire Lent; and it is to the excessive fatigue thus induced that the premature break-down of his strength is ascribed. To the labors of the pulpit he added those also of the press. He published an apology of his order in 1844; and in 1854 a more lengthened work with the same view, *Clement XIII. et Clement XIV.*, 2 vols. 8vo, which was intended as a reply to the *Life of Clement XIV.*, by the Oratorian father Theiner. These, with some occasional sermons and "conferences," constitute the sum of the publications issued during his life. In 1855 he was invited by the emperor Napoleon III. to preach the Lent at the Tuileries. On Feb. 26, 1858, he died in the convent of his order at Paris, in his 63d year. His memoirs have been published by his brethren, and a collected edition of his works and remains has been for some time in progress.

RAVINA'LA. See Traveler's Tree.

RAWAL PINDI, a large walled t. of the Punjab, in the doab between the rivers Indus and Jhelum. It contains a large bazaar, and carries on an active transit-trade between Hindustan and Afghanistan, but is not otherwise noteworthy. Pop. '68, 19,222.

RAWDON, Lord. See Hastings, Francis.

RA'WICZ, a t. of Prussia, in the government of Posen, close to the Silesian frontier, 64 m. s. of Posen by railway. It is surrounded by walls. Spinning, weaving, brewing, manufactures of tobacco and leather, and a considerable trade, are carried on. Pop. '72, 10,671.

RAWLE, William, LL.D., 1759–1836; b. Philadelphia; educated at the college of New Jersey. He studied law in New York, London, and Paris, and in 1783 began to practice in Philadelphia. He was a member of the legislature 1789, and U. S. district attorney 1791–99. He was the first president of the Pennsylvania historical society. He framed the new civil code for Pennsylvania, and wrote *A View of the Constitution of the United States*, 1829.

RAWLINS, a co. in n.w. Kansas, having the state line of Nebraska for its n. boundary; drained by Beaver creek and the North and South forks of Sappa creek; 1050 sq.m.; pop. '80, 1623—1332 of American birth. Numerous creeks and rivulets flow through it from the Republican fork of the Kansas river, making a fertile agricultural region, well-timbered and affording excellent pasturage.

RAWLINS, JOHN A., 1831-69; b. Guilford, Ill.; farmer until 1854; studied law at Galena, and established a successful practice before the rebellion, in which he served on the Union side as assistant adj.gen., rank of capt., on gen. Grant's staff through the campaigns of 1862 and 1863, and was made chief of staff in 1865, ranking as brig.gen. in the regular army. He was secretary of war 1869.

RAWLINSON, Sir HENRY, K.C.B., oriental scholar and diplomatist, was b. at Chaldington, Oxfordshire, in 1810, and educated at Ealing, Middlesex. He entered the East India military service in 1826, and served in the Bombay presidency until 1833, when he was appointed to assist in reorganizing the army of the shah of Persia. He had early devoted himself to eastern languages and antiquarian researches, and when stationed at Kermanshah, in 1835, he began to study the cuneiform (q.v.) inscriptions of Persia. He announced his cuneiform discoveries in 1837-38 to the Royal Asiatic society of London, and published his travels in Susiana in the *Geographical Society's Journal.* He also made a translation of the Behistun inscription, a most important event in the history of the study of the old Persian languages. After residing as political agent at Candahar (1840-42) and Bagdad (from 1843), he returned to England with the rank of consul-general in 1855. In Jan., 1858, he was elected M.P. for Reigate, but vacated the seat in September, on being appointed a member of the council of India. In 1859 he proceeded to Teheran as envoy-extraordinary and minister-plenipotentiary to the court of the shah. He was returned to parliament as member for Frome, and retained his seat till the general election of 1868. In 1871 Rawlinson became president of the Royal geographical society, an office which he retained until June, 1873. Rawlinson is the author of a large number of most valuable papers on geography, archæology, history, and modern politics, chiefly connected with Persia and the surrounding countries. The greater number of these have been read to learned societies, but others have appeared in periodical publications. He is also the author of a work entitled *England and Russia in the East* (1875). Rawlinson has not confined his attention to eastern subjects, and his addresses to the geographical society, and on geography and history generally to the Midland institute at Birmingham, on Oct. 6, 1873, show how varied and extensive his acquirements are. Rawlinson was admitted as corresponding member of the institute of France in 1837, and in 1851 was made chevalier of the order of merit by the king of Prussia.—RAWLINSON, Rev. GEORGE, brother of the preceding, graduated at Oxford, and was elected a fellow and tutor of Exeter college. Appointed Bampton lecturer in 1859, he published his lectures in the following year under the title of *Historic Evidence for the Truth of Christian Records.* Other works of Rawlinson's are an edition of Herodotus, in which many of his brother's discoveries are incorporated; *The Five Great Monarchies of the Ancient World—Chaldæa, Assyria, Babylonia, Media, and Persia; Manual of Ancient History* (1859); the *Sixth Oriental Monarchy—Parthia* (1873); and the *Seventh Oriental Monarchy—the Sassanians* (1875).

RAWSON, ALBERT LEIGHTON, b. Vt., 1829; visited Palestine and other eastern countries; traveled, in 1851-52, from Cairo to Mecca with the pilgrims, under the disguise of a Mohammedan medical student. He published, *The Divine Origin of the Holy Bible; The Pronouncing Bible Dictionary; History of all Religions; Statistics of Protestantism; Antiquities of the Orient; Grammar of the Turkish and Arabic Languages.*

RAWSON, EDWARD, 1615-93; b. England; settled in Newbury, Mass., in 1636; represented that town in the general court for several years, was clerk of that body, and secretary of the Massachusetts colony. He published *The General Laws and Liberties Concerning the Inhabitants of the Massachusetts.*

RAY, *Raia*, a Linnæan genus of cartilaginous fishes, belonging to the order *plagiostomi* (q.v.) of Müller, and now divided into a number of genera, which form the family *raiidæ* of many naturalists, and the suborder *raiæ* of some. The true rays have a flat body; the pectoral fins are large and fleshy, appearing as lateral expansions of the body, and along with it forming a circular disk or a rhomboid, to which is attached a rather long and slender tail. The pectoral fins are prolonged till they meet in front of the snout, and backward till they join the ventral fins. The eyes look upward, and the spout-holes or spiracles are also directed upward. The gill-openings, which are five in number, are on the under side of the body, where also the mouth is situated. The gills are close behind the mouth; and toward the tail are the stomach, intestines, and other viscera, in a circular cavity. The males are furnished with claspers. The eggs are large, resembling those of sharks, but more rectangular in form; thin horny cases, with projections at each of the four corners, having such a resemblance to a hand-barrow, that on some parts of the English coast they receive the name *skate-barrows.* They are also familiarly known as *purses*, and are very often to be seen cast up by the waves upon the beach. Rays live mostly near the bottom of the sea, and where the bottom is sand or mud. When disturbed, they glide in an undulating manner, and defend themselves against assailants by lashing with the tail, which is generally armed with spines, and in some species—called *sting rays* (q.v.), the family *trygonidæ* of some naturalists—carries a single long and strong spine, notched on both sides, a formidable weapon, which is used somewhat as a saw. Rays are very voracious; they devour fishes, mollusks, and crustaceans. Many of the rays are popularly called SKATE. All of them are edible; some, however, are much better than others; and whilst, on some parts of the British coast they are regularly used for food, and brought to market, on other parts of the coast, they are rejected, and are thrown out to rot on the beach. Of British species, two of the most common are the thornback (q.v.) and the homelyn (q.v.). Another is the common skate, also called the blue skate or gray skate (*raia batis*), which is better than either the thornback or homelyn as an article of food. The long-nosed skate (*R. mucronata*) and the white skate (*R. oxyrhynchus*) are also common. The skates sometimes attain a very large size, more than 8 ft. in breadth.—*Torpedo* (q.v.), *cephaloptera* (q.v.), etc., are genera of rays.

RAY, a co. in n.w. Missouri on the n. bank of the Missouri river, drained also by Crooked and Fishing rivers; traversed by the St. Louis, Kansas City and Northern rail road, and its St. Joseph branch; 570 sq.m.; pop. '80, 20,193—19,765 of American birth. Surface partly prairie and partly woodland; tobacco, corn, oats, wheat, sorghum, and wool are staples. Sheep, horses, and cattle are raised in great numbers. Coal and limestone are found. Co. seat, Richmond.

RAY (or, as he himself occasionally spelled it, **WRAY**), JOHN, an eminent naturalist, was b. at Black-Notley, near Braintree, in Essex, Nov. 29, 1627. He went to Cambridge university, where, after having finished his course, he was elected a fellow, and appointed Greek lecturer, and afterward mathematical tutor in Trinity college; but after a time began to devote himself entirely to the study of natural history. Accompanied by a kindred spirit, Francis Willughby, a friend and former pupil of his own, Ray traveled over most of the United Kingdom, collecting and investigating botanical and zoological specimens; and in 1663 they started on a tour through the Low Countries, Germany, Italy, and France, with a similar object, Willughby taking the zoology under his charge, leaving Ray the botany. In 1667 Ray was elected a fellow of the Royal society, to whose *Transactions* he occasionally contributed valuable papers. In 1672, his friend Willughby, with whom Ray had lived ever since he had left the university, died, leaving him guardian to his two sons (the younger of whom was afterward raised to the peerage as baron Middleton), an office which Ray discharged, and then, after several changes of residence, settled down in his native village, where he died, Jan. 17, 1705. As a botanist and zoologist, Ray ranks very high, being distinguished for his patience, acuteness, and sagacity; and in knowledge he seems to have been far in advance of his time, as the new method of classification of plants which he proposed, though little appreciated or adopted by his contemporaries and immediate successors, was eagerly laid hold of by Jussieu and others, under whose hands it became the foundation of what is now known as the "natural system" of classification. Ray's zoological works are considered by Cuvier as the foundation of modern zoology. In zoology, as in botany, Ray's works are remarkable for the precision and clearness of the classification which he adopts, his divisions in the former subject being founded on the structure of the heart and the organs of respiration. The chief of his works on botany are *Methodus Plantarum Nova* (1682, 2d ed., revised and amended by himself), in which he details the principles of his new method of classification of plants; *Catalogus Plantarum Angliæ* (1670), the basis of all the subsequent floras of this country; and a second (1677), third (1690), and fourth (1696) edition of which were published by himself; *Historia Plantarum* (3 vols. 1686–1704), a compilation, including descriptions of all the species which were then known. His zoological works include the *Synopsis Methodica Animalium Quadrupedum et Serpentini Generis* (1693), and three posthumous volumes on birds, fishes, and insects, published by Dr. Derham. He was also the author of some theological works. His friend Willughby having collected the materials for an extensive work on the animal kingdom, left to Ray the task of arranging and classifying them, and the work accordingly appeared in 3 vols., the *Ornithologia* in 1676, with an English translation by Ray in the following year, and the *Historia Piscium* in 1686 (2 vols.). In these volumes were described a large number of species of birds and fishes, which had escaped the observation of previous naturalists.

RAYMOND, HENRY JARVIS, LL.D., 1820–69; b. N. Y.; son of a farmer in Lima, N.Y.; passed his younger days on his father's farm. He graduated at the university of Vermont in 1840, and studied law in New York, in the mean time supporting himself by contributing sketches to the *New Yorker*, a literary weekly, and teaching. In 1841, on the establishment of the *New York Tribune*, Mr. Raymond was attached to the editorial staff, but distinguished himself specially by the ability which he manifested as a reporter. In this profession he became quite unrivaled, his accuracy being unquestioned. In 1848 he transferred his services to the *Courier and Enquirer*, which connection he maintained until 1851; at the same time, and until 10 years later, filling a literary position in the house of Harper & Brothers, publishers. In 1849 he was elected by the whig party to the state legislature, and re-elected in the following year, when he was chosen speaker; in 1851 he visited Europe. Sept. 18, 1851, he published the first number of the *New York*

Times. In 1854 he was elected lieut.gov. of the state, and took a prominent part in the canvass for Fremont in 1856, and for Lincoln in 1860. He was an ardent supporter of the union cause during the war. In 1864 he was elected to congress, where he supported president Johnson's reconstruction policy. Mr. Raymond was first among American journalists. He was in Italy during the Franco-Austrian war in 1859, and gained high repute for his account of the battle of Solferino, which was remarkable both as a specimen of vivid writing, and as an extraordinary journalistic victory, the *Times*, in this instance, beating all its competitors. Mr. Raymond was the author of *A History of the Administration of President Lincoln*, 1864; *A Life of President Lincoln*, 1865; and *Life of Daniel Webster*, 1853. His death was sudden, and was attributed to overwork.

RAYMOND, JOHN HOWARD, LL.D., 1814–78; b. New York; studied in Columbia college; graduated at Union college in 1832; studied law at New Haven, but while there his religious views and character were changed, and he resolved to enter the ministry; returned in 1835 to Hamilton, and entered the institute, now Madison university. He was ordained; declined several important pastorates, and gave himself to teaching. After holding professorships in Madison university, he accepted, 1851, a professorship in Rochester university, but was soon called to the Brooklyn polytechnic institute. In 1854 he became president of Vassar college, filling also the chair of mental and moral philosophy, where he remained until his death. He was distinguished as an organizer, was pleasing and dignified in manner, original and energetic as a teacher. The college greatly prospered under his direction.

RAYMOND, ROSSITER WORTHINGTON, b. Ohio, 1840; graduated at the Brooklyn polytechnic institute in 1858. After spending three years in study at Heidelberg, Munich, and Freiberg, he began practice in 1864 in New York as a consulting engineer. Since 1867 he has been connected with mining journals, and in 1870 was appointed lecturer in Lafayette college on economic geology. In 1871 he was elected vice-president of the American institute of mining engineers, and 1872–74 was its president. He has published annual reports of mining statistics, 1869–75; *The Children's Week; Brave Hearts; The Man in the Moon;* and other stories.

RAYNAL, GUILLAUME THOMAS FRANÇOIS, 1713–96; b. France; educated for the priesthood with the Jesuits of Pézénas. In 1747 he went to Paris, and was attached to the church St. Sulpice as a poor Bohemian ecclesiastic. It is told that at this time, while the minimum price of a mass by the abbé Prevost was 20 sous, and a cheaper one was offered by the abbé Laporte at 15 sous, Raynal closed the market at 8 sous. His peculiarities soon led him out of the church, and he became one of the editors of the *Mercure de France*, where his thoroughly philosophic mind found associates and scope, and his taste for history made him a historian. His works, though not now of high value, were conspicuous in their time, when philosophy and literary independence were novelties. Among his works were *Histoire Philosophique et Politique des Établissements, et du Commerce des Européens dans les deux Indes*, which contained writings of Diderot as well as Raynal. The work was so full of disrespect of priesthood and superstition that it fell under the condemnation of the parliament, which in 1781 ordered the book to be burned, the author arrested, and his property confiscated; which, however, was not done. Raynal, who had by this time become renowned for the democratic philosophy of his works, traveled to England, Germany, and Russia, and was received with distinction by the classes whose status was to be undermined by his principles. He was elected to the states-general at the beginning of the French revolution in 1789, but was already near his dotage, and made no figure in the great events which followed.

RAYNOUARD, FRANÇOIS JUSTE MARIE, a French poet and philologist, was b. at Brignoles, in Provence, Sept. 8, 1761. He studied at Aix, and came to Paris to cultivate literature at the age of 23, but soon went back to the south, and joined the bar at Draguignan, where he acquired a high reputation. In 1791 he was elected a member of the legislative assembly; but after the fall of the Girondins, whose opinions he shared, he was thrown into prison, and fortunately forgotten. Released from confinement after the fall of Robespierre, he resumed his profession of advocate, and in the course of five or ten years, acquired a modest competency. He then returned to Paris, and devoted himself anew to literary pursuits. His first poem, *Socrate au Temple d'Aglaure* (Par. 1803), was followed by the tragedies, *Eléonore de Bavière* and *Les Templiers*, the latter of which was brought on the stage in 1805, and met with unbounded success. Two years later Raynouard was chosen a member of the academy, of which he became perpetual secretary in 1817. He had been made a member of the imperial legislative body in 1806, and Napoleon, it is said, even meditated appointing him to the presidency, but could not get over Raynouard's brusque manner and fearless independence of spirit. The principal dramas which he wrote during the *régime* of Napoleon, beside those already mentioned, are *Scipio; Les Etats de Blois; Don Carlos; Charles I.; Debora; Jeanne d'Arc à Orléans*. Toward the fall of the empire his attention was turned to linguistic studies, particularly to the study of the Provençal language and literature; and his researches into the origin, grammatical rules, and transformations of the Romance tongue, led to many valuable discoveries, though his theories as to the relation of the language of the troubadours to the other tongues derived from Latin, have been shown to be erroneous (see ROMANIC LANGUAGES). His chief writings in this department are—*Eléments de la*

Grammaire Romane (Par. 1816); *Choix de Poésies Originales des Troubadours* (Par. 6 vols., 1816–21); *Grammaire comparée des Langues de l'Europe Latine dans leur Rapports avec la Langue des Troubadours* (Par. 1821); *Observations Philologiques sur le Roman du Rou* (Rouen, 1829); *Influence de la Langue Romane* (Par. 1835); and *Lexique Roman, ou Dictionnaire de la Langue des Troubadours* (Paris, 6 vols., 1838–44). Raynouard died at Passy, near Paris, Oct. 27, 1836.

RAZOR, the sharp-bladed instrument used for shaving the beard, has been in use from very ancient times; it is alluded to by Homer, and shaving was in fashionable use by the Greeks and Romans (see BEARD), as a mark of civilization. Razors are almost universally metal blades, made exceedingly sharp; but an exception to this is found in some of the razors used by savage nations, as, for instance, the Tahitians, who use pieces of shells and sharks' teeth, upon which they grind very fine edges, sufficiently sharp to remove the beard. The Chinese and Japanese, who shave the head as well as the chin, use razors similar to the European, except that they rarely have handles. The steel of which they are made is of a remarkably fine quality.

The manufacture of razors in Great Britain is chiefly carried on in Sheffield, which place also supplies a large export trade. Great care is exercised in choosing the steel for making the blade, but, notwithstanding this, there is scarcely an article made by cutlers which is so uncertain in quality when used. Nearly 20 operations are required to produce a razor; nevertheless, such is the perfection to which manufactures are brought by a division of labor, and the application of machinery, that the razors supplied to the army (at the contract price of 4½d. each) cannot be surpassed for quality.

RAZOR-BILL, or RAZOR-BILLED AUK, *Alca torda*, a species of auk (q.v.), also called the black-billed auk, very common on the coasts of Britain, and of all the northern parts of the Atlantic ocean, frequenting lofty precipices, from which its eggs are taken, with those of guillemots, etc., by persons who are let down by ropes for that purpose. The eggs are esteemed a delicacy; and the flesh of the bird itself is much used for food. Great numbers of razor-bills are annually killed for the sake of their feathers, particularly on the coast of Labrador, where they are extremely abundant. The razor-bill is about 17 in. long, from the extremity of the bill to that of the tail. It is a very fierce bird, and, if seized, will lay hold of the hand in return, and submit to be choked ere it will let go. The egg is about three inches long. The bird lays one or two, upon ledges of rock or in fissures.

RAZOR-FISH, or RAZOR-SHELL. See SOLEN.

RAZOR-STROP, an article used for the purpose of sharpening razors. It usually consists of a piece of wood, an inch and a half broad, and 10 or 12 in. long, upon each side of which is glued a piece of leather; one of the pieces of leather is usually dressed with a composition of carbonate of iron and grease, which is used first, and the sharpening is finished on the undressed leather of the other side. A leathern strop is frequently used without fixing on wood. In the West Indies razor-strops are commonly made of pieces of the wood of *yucca gloriosa*, *eriodendron anfractuosum*, *agava vivipara*, *ochroma lagopus*, and *anona palustris*, all of which contain minute deposits of silica in their cellular structure, which render them very efficient for the purpose. Species of *boletus* are so used in Britain

REACTION, a term used in reference to the political history of a nation, to designate that tendency, often showing itself, to recoil from the effects of reform or revolution, and to seek a restoration of the previous state of things, or even of one still more antiquated and despotic. The causes that lead to reaction are various. Sometimes it springs, partly at least, from mere disappointment at the smallness of the *visible* results of those changes advocated with so much eloquence, and waited for with so much enthusiasm and hope. The inconsiderate imagination of the people expects a millennium to follow every important change; and when, after the event, men find they are still in the old world of imperfections, hardships, and sorrows, they are prone to believe that they have been deluded, and are only too willing to lend an ear to the insidious misrepresentations of those who are opposed to all progress. But more frequently political reaction springs from immature, or injudicious, or extravagant revolution. The times are not yet ripe (as in the first Italian revolts), or the leaders are unfit (as in the German and Hungarian struggles of 1848–49), or excesses are committed (as in the great French outbreak of 1789), and so a revolution is nipped in the bud, or overthrown on the battle-field; or, inflamed with sanguinary thirst of revenge, it goes mad in a "reign of terror," and exhausting itself in unprofitable frenzies, falls at last an easy prey to any bold and unscrupulous adventurer whom the crowd may elect out of desperation and disgust of anarchy, and whose rule is as absolute as any that preceded it. A reaction may thus, in certain cases, be useful, in so far as it teaches reformers and revolutionists the point beyond which nature forbids them to go; but its agents are almost invariably base in character, odious in their principles, and selfish in their projects. Religious reactions exhibit the same characteristics as political ones, and proceed from the same causes.

REACTION is the term employed in medicine and surgery to indicate the process of recovery from a state of collapse. The subjects collapse, reaction, and the general effects of shock upon the system are considered in the article on SHOCK.

READ, GEORGE, 1733–98; b. Md.; educated at Chester and New London; in 1753 was admitted to the bar, and began practice at Newcastle, Delaware. He held several local offices, and was a member of the continental congress 1774–77. In 1777 he became vice.pres. of Delaware, and later acting-president. He was the author of the first Delaware state constitution and a member of the convention that framed the U. S. constitution. In 1782 he was made judge of the court of appeals in admiralty cases; 1789–93 U. S. senator; and from 1793–98 chief justice of the Delaware supreme court.

READ, GEORGE CAMPBELL, d. 1862; b. Ireland; entered the U. S. navy as midshipman 1804, rising through successive grades to rear-admiral in 1862. He bore a record of bravery and courtesy. In the war of 1812, after the engagement between the *Constitution* and the British frigate *Guerriere*, he received the sword of capt. Dacres. In the autumn of 1812 he was in the action between the *United States* and the *Macedonian.* In 1862 he was appointed governor of the Philadelphia naval asylum, which position he held at his death. A narrative of his voyage around the world was published in 2 vols., 1840.

READ, JOHN MEREDITH, 1787–1874; b. Philadelphia; grandson of George, a signer of the declaration of independence; graduated at the university of Pennsylvania 1812, entered at the bar 1818, was district attorney, city solicitor, and member of the city council, and represented his district in the state legislature, 1823; re-elected 1824. In 1851, associated with Thaddeus Stevens, he defended C. Hanway in his trial for constructive treason. He was attorney-general of the state and judge-advocate of the court of inquiry on com. Elliot, judge of the supreme court of Pennsylvania 1860. He was author of many addresses, opinions, lectures, and newspaper articles.

READ, NATHAN, 1759–1849; b. Mass.; graduated at Harvard in 1781, and was tutor there 1783–87. He settled in Danvers in 1795, and began the manufacture of anchors, cables, etc. The next year he invented a machine for cutting and heading nails at one operation. He had, in 1791, attempted to utilize steam for navigation, and had propelled a boat by means of paddles moved by steam. He was a member of congress 1800–03, and in 1807 removed to Belfast, Maine, where he was for some years chief justice of the court of common pleas. He was the first person in this country to apply for a patent; at that time no patent law had been passed. Among his inventions were a method of equalizing the action of wind-mills, pumping-engines, and threshing-machines, and tubular steam boilers.

READ, THOMAS BUCHANAN, 1822–72; b. Penn.; entered a sculptor's studio in Cincinnati, but afterward studied painting. In 1841 he settled in Boston, and began to paint portraits. In 1846 he returned to Philadelphia, and in 1850 went to Florence, where he spent most of the rest of his life. Among his works are *Lays and Ballads* (1848); *The House by the Sea* (1856); *The Wagoner of the Alleghanies* (1862); *A Summer Story* (1865); and *Poetical Works* (1866).

READE, CHARLES, D.C.L., one of the more distinguished novelists of the day, was born in 1814. He is the youngest son of the late John Reade, esq., of Ipsden House, Oxfordshire. He received his college education at Oxford, and so distinguished himself as to secure a fellowship. In 1843 he was called to the bar as a member of Lincoln's inn; but his legal studies may be presumed to have been merely nominal, and in no long time it became obvious that his chosen career was that of literature. The books by which he first became known as a writer of distinct mark and promise were his *Peg Woffington* and *Christie Johnstone*, both full of talent, though as yet somewhat crude and immature. In 1856 he fairly established his reputation in the novel in 3 vols., *Never too Late to Mend*, the first of a series of novels, each illustrating some social or public evil. Among his subsequent works are a tale in one volume, *The Course of True Love*, remarkable for a rare nicety and subtlety in the delineation of its leading female character; *White Lies* (3 vols. 1858); *The Cloister and the Hearth; Hard Cash* (1863); *Griffith Gaunt* (1866); *Put Yourself in His Place* (1870); *A Terrible Temptation* (1871); and *A Simpleton* (1873). He is besides the author of several dramas, which have had more or less success on the stage; the most general favorite, perhaps, being that entitled *Masks and Faces.* Mr. Reade is by common consent a writer of marked ability. He has much of the true talent of the *raconteur*, along with considerable dramatic instinct, and from all his later novels, a sense of general intellectual vigor is strongly borne in upon the reader; while a certain wayward crotchetiness and odd aggressive eccentricity from time to time cropping out, serve rather to give to his writing some relish and sting of individuality, than seriously to mar its effect.

READE, WILLIAM WINWOOD, 1839–75; b. Oxfordshire, England; nephew of Charles the novelist. He was noted as a traveler and African explorer. His first African journey was in 1862, and on his return he published an account of his tour called *Savage Africa.*. In 1868 he started from Sierra Leone and traveled to the sources of the Niger, and in 1873 the London *Times* sent him as special correspondent with the Ashantee expedition. In 1875 he published *Story of the Ashantee Campaign.* Mr. Reade wrote several novels of no great merit, such as *Charlotte and Myra* (1859), and *The Outcast* (1875).

READING, a flourishing municipal and parliamentary borough of England, capital of Berkshire, stands on the left bank of the Kennet, 1½ m. above the junction of that river with the Thames, and 36 m. w. of London by the Great Western railway. It is irregular in plan, though recently it has been improved in this respect. The tongue of land immediately above the confluence of the rivers is the chief business part of the town. The church of St. Lawrence, with a tall flint tower, still shows traces of its original Norman character; and the Benedictine abbey, now a mere shell, was founded in 1121, and was at one time the third in size and wealth in the country. Of the numerous educational establishments, the free grammar-school, to which are attached two fellowships at St. John's college, Oxford, and two scholarships, has an endowment of £50 per annum. Reading is an important mart for corn and other agricultural produce, carries on manufactures of silks, silk-ribbons, etc., and has extensive iron-works and a large biscuit factory. Pop. '71, 32,324.

READING, a city of Pennsylvania, on the left bank of the Schuylkill river, 58 m. n.w. from Philadelphia, pleasantly situated on an ascending plain, and supplied by a mountain behind it with streams of pure water. Reading has regular streets, public offices, several newspapers, blast-furnaces, rolling-mills, foundries, manufactories of steam-engines and machinery, cottons, woolens, nails; also flour and saw mills, with a large trade in coal by canal and railway. Pop. '70, 33,930.

READING (*ante*), a city in s.e. Pennsylvania, incorporated 1847. The original survey comprised 450 acres set off by Thomas and Richard Penn in 1748. It is on the Philadelphia and Reading railroad, at the junction of the East Pennsylvania, the Reading and Columbia, and the Berks and Lehigh railroads; also at the junction of the Schuylkill and Union canals; pop. '80, 43,280. The river is here crossed by three bridges. It is 55 m. n.e. of Harrisburg. On the e. is Penn's mount, containing extensive beds of iron ore, on the s Neversink mountain. It contains two opera houses, a jail, an academy of music, several hotels, a public library, public schools (including high and normal), a Roman Catholic academy, and other private institutions of learning, and several charitable institutions, including a Roman Catholic hospital. The court-house is a fine building having an imposing front with columns of red sandstone. The municipal government is divided into 9 wards, governed by a mayor, a select council of 9, and a common council of 28. It has a well-organized fire department, an efficient police force, 3 national banks with an aggregate capital of $700,000, a savings-bank with deposits amounting to $100,000, and 4 fire-insurance companies. The principal buildings are erected with great regularity on streets crossing at right angles. Among the manufactories are shoe factories, breweries, tanneries, and the railroad repair shops; cigars, hats, bricks, lumber, paper, etc., are manufactured. It supports 11 newspapers, the larger number German, and is the center of a rich farming district, and active local trade.

READING AND SPEAKING. Reading is the delivery of language from writing; speaking is the utterance of spontaneous composition. Reading is merely mechanical when words are intelligibly but unimpressively delivered; and it is oratorial in effect when the sentiment proper to the utterance is expressed by pauses, tones, emphasis, etc. Recitation from memory is another form of reading, the matter being delivered from a mental transcript. This mode is highly favorable to oratorical effect, but it is limited in application, and untrustworthy where exactness of phraseology is important. Speaking from spontaneous composition is the highest form of oratory. The qualities requisite for these arts are very different.

To read well involves a perfect understanding of the construction of sentences, and ability to analyze complex forms of composition, and discriminate between essential and expletive words; it also involves a nice perception of the qualities of modulation, and their relation to expressiveness, together with ability to regulate the voice so as exactly to suit the sound to the sense. The study of the art of reading is thus valuable as a means of improvement in composition, as well as for its influence in refining the taste, and exercising all the faculties of perception, expression, and adaptation.

In good reading, the thoughts of the writer must first be taken into the reader's mind, and then delivered as the writer himself might have uttered them immediately on their conception. Children, when set to read language above their comprehension, are of necessity merely mechanical readers; and in this way they acquire habits of unintelligent reading, which are seldom perfectly thrown off in after-life. In silent reading, or the perusal of language for our own information, we gather the sense as we proceed, and correct misapprehensions by reflection; in reading aloud for the information of others, we must perfectly comprehend the matter before we utter it, so as to avoid misleading the hearer. A practiced reader can, no doubt, exercise sufficient prevision at the time of reading, by keeping his eye in advance of his utterance, to read any ordinary composition fairly at first sight; but for public reading this would be insufficient. Whatever is to be read in public should first be well studied in private. The reader thus knowing definitely what he has to express, will give forth no uncertain sounds, and his manner will have the freedom of memoriter delivery, without the disadvantage of its constraint upon the mind. His whole attention will be concentrated on the object of his reading, the effective *conveyance* of the matter and spirit of the composition. The presence of the book before him will be necessary chiefly to give confidence, and prevent the possibility of rambling. The eye, assisted by memory, will take in clauses and even sentences at a glance, so that it may be freely raised during utterance. If the eye of a reader is fixed on the book, he seems to be perusing it for his own information; but if he look his hearers in the face, as, with due preparation, he should be able to do, his delivery may have all the qualities of spontaneous oratory, and be to the hearers speaking rather than reading. This effectiveness is rarely exemplified, because the requirements for public reading are so little understood, and so habitually neglected in our systems of education. The tameness, monotony, and rhythmical sing-song so generally associated with reading, have created a prejudice against the use of "paper" in pulpit addresses, in consequence of which, in some churches, the practice of reading sermons is discountenanced, while in others it is positively interdicted. The quality of sermons, as compositions, is seriously impaired under such circumstances; but the cure for bad reading—against which the prejudice is directed—is *good* reading. All men cannot be orators, but all may be taught to read oratorically; and were students systematically trained in this art, the services of the church would be rendered far more attractive and influential. In the absence of this training, preachers are the most ineffective of public speakers; and discourses prepared to be delivered from memory are among the meanest specimens of literary compositions.

The chief points of difference between ordinary reading and the utterance of spontaneous composition are the uniform force and time, and continuative tones of the former, as contrasted with the reflective breaks and varying modulations and emphases of the latter. The speaker feels what he wishes to say, and he conveys with definiteness the felt relation of each word to the idea which is dominant in his mind. Expletive and explanatory phrases are given parenthetically; ellipses, interpolations between grammatically related words, similes, quotations, and all other elements of rhetorical style, are indicated by changes of modulation; and the *point* of every sentence is made unmistakably apparent. The reader sees all the parts of a sentence level to his eye, and he is apt to deliver them with a corresponding indiscriminativeness of manner; either without variety of time, tone, and stress, or with mere alternation of force and feebleness, or the equal indefiniteness of emphasis on every phrase.

The first requisite for effective reading is a clear conception of the author's intention, together with such a command of the voice as may enable the reader to express that one meaning to the exclusion of all other possible meanings. For every cluster of words is like a many-sided crystal, which may be made to throw light from any of its facets, according as one or another of them is presented uppermost. The most prominent word in the utterance of a sentence is not necessarily the most important grammatical word, but that which is new in reference to the context; and such words as are already before the mind—whether directly stated, inferentially included in former expressions, or otherwise implied—are pronounced with subordinateness of manner. Thus, in the following lines:

The quality of mercy is not strained,
It droppeth as the gentle rain from heaven
Upon the place beneath. It is twice blessed:
It blesseth him that gives and him that takes.

If the first line were read independently, it would be emphasized as follows

The quality of *mercy* | is not *strained;*

but if read in connection with the preceding context, the emphasis would be different. Thus:

Portia. Then must the Jew have mercy.
Shylock. On what compulsion must I? Tell me that.

"Mercy" and the "compulsion" of mercy being thus already before the mind, the chief point in Portia's reply will now be:

The quality of mercy *is* not strained,
It droppeth, etc.

But, as to "drop" is the natural characteristic of "rain," and as rain always falls "from heaven," and necessarily upon the "place beneath," these implied words will be pronounced subordinately; thus:

It droppeth as the *gentle rain* from heaven
Upon the place beneath.

Bearing in mind, further, that mercy is of necessity "blessed," the reader will proceed:

It is *twice* blessed;

and as the object of the speech is to *solicit* mercy, he will give prominence to the word that advances the suit. Thus:

It blesseth him that *gives*, and him that takes.

On this principle, the reader shows that he has, in his own mind, performed the writer's process of thought, and so made the language which he interprets virtually his own. But in order to express with definiteness the thoughts and sentiments thus adopted, the reader must have the *instrument* of expressiveness perfectly under control. His voice should have no more predisposition to any particular tune than the flute or violin of a musician. Tones have an inherent value, which is above and independent of language, so that assertive construction may be made to convey interrogative meaning, and interrogative language may have assertive or imperative force. The modulations of the voice unravel all the complexities of composition, separating words from their immediate context, or connecting them with others from which they are most widely separated in the sentence. Thus, in the following lines:

> Slowly and sadly we laid him down,
> From the field of his fame fresh and gory,

the clause "fresh and gory" is, by relative modulation, shown to refer to "him" in the preceding line, and not to the nearer words "fame" or "field." So, also, in the following passage: "And they came with haste, and found Joseph and Mary, and the babe lying in a manger." Here the series "Joseph and Mary | and the babe" is divided by a modulation of the voice, so as to show that the last word "babe" is alone the grammatical antecedent to the clause "lying in a manger." From such illustrations it will be obvious that good reading involves close thinking, and that the governing qualities of tone demand accurate appreciation and careful culture.

The tones of the speaking voice are all more or less *inflected*, in which respect they differ essentially from singing tones, which are level, and only varied in pitch. The term "modulation," as understood by elocutionists, has reference to the general pitch of the vocal inflections in a passage. The inflections themselves are all either rising or falling. The rising turn of voice carries on the hearer's attention to what is to *follow*—the falling turn directs attention to what has gone *before;* the former asks, or appeals to the hearer—the latter affirms or enjoins from the speaker; the former is negative—the latter is positive. Simple inflections rise or fall directly from their accentual pitch to their termination, and the range of the inflection may have any extent, from less than a semitone to more than an octave. The strongest rising tones are expressive of interrogation, incredulity, or entreaty, and the strongest falling tones of affirmation, assurance, or command. Compound inflections unite the two vocal movements—falling before a rising termination, and rising before a falling termination—with one accentual impulse; and the effect of this opposition of tone is to add to the expressiveness of the termination a suggestion or *inference* in accordance with the expressiveness of the commencing turn. Thus: "Not ǒne," with compound rising tone, implies "but more." "Even ône," with compound falling tone, implies "and not more."

The emphatic force of tones depends on their accentual pitch in relation to that of preceding tones, as well as on the extent and the direction of the inflection. The amount of possible variety in these degrees is exceedingly great, but the peculiar expressiveness of individual modes of inflection is definite, traceable to systematic principles, and of limited extent, depending principally on three qualities—

1. Rising or falling accent as well as termination; as
   Cónstánt, Cònstànt.
2. Rising or falling accent with opposite termination; as
   Cǒnstánt, Cônstànt.
3. Accent higher or lower than preceding pitch; as
   díe? To To drêam.
   To sléep. sléep? Perchance to

These three sources of vocal variety the student of elocution should have under ready and perfect control.

The art of elocution has received comparatively little attention in modern times. The value of a good delivery is certainly not less now than it was among the orators of ancient Greece and Rome; but the assiduity with which the art was cultivated by the latter, and the estimation in which it was held by them, present a strong contrast to the negligence and apathy of modern speakers in regard to delivery. This fact is not easily accounted for; the influence of elocution being such, that an inferior address well delivered never fails to create a stronger impression on an audience, than the most masterly composition that lacks the graces and enforcements of effective utterance and action.

The model for effective reading is to be found in the ordinary style of animated conversation. The speaker's tones are not governed by the laws of punctuation, or by formal grammatical periods. Every clause in a sentence is, to the speaker, a period. The most complex sentence is only an aggregation of correlative sentences, each of which is a separate act of thought, and should be delivered as such in reading, as it always is in speaking. Modulation will show the relation of each part to the whole, but inflection should at the same time show each part to be in itself complete, as the statement of a distinct though subordinate fact or circumstance.

The rules which some elocutionists have laid down for the reading of sentences, are clearly at variance with this natural principle of intonation, and they lead to an artificiality of manner which is at best a pedantic tune. The formal arrangements of inflections which have been gravely prescribed for "simple" and "compound," "commencing" and "concluding" series, "penultimate" and "ante-penultimate" clauses, etc., have done much to discourage students from paying proper attention to the art of elocution, and have almost justified the denunciations of some authors, who have declared elocution to be altogether unworthy of study. Thus, archbishop Whately, in his disgust at the jerking alternations of ups and downs prescribed in elocutionary rules, counsels students to have nothing to do with rules, but simply to be "natural." To be natural, however, is to follow those laws or principles which undoubtedly are to be deduced from the operations of the voice in spontaneous speaking; and these must be studied by all who would be "natural" in practising the art of reading. In elocution, as in painting and in every art, the highest attainment of the finished artist is to be natural. Nature and art are not opposites; the former is the *end* of the latter; the latter the *means* to the former. To be natural does not "come by nature," but by art; and "art itself is nature." Elocution, therefore, is none the less "natural," that it must be studied as an art; and the study of this art is not justly to be contemned, whatever condemnation may be due to the errors of elocutionists.

To acquire a natural style of reading, the chief point to be attended to is the logical clausing of sentences, so as to present, with separate completeness to the hearer's mind, every fact and every associated circumstance, whether principal or subordinate. Punctuation is not a sufficient guide for this purpose; it will sometimes even mislead. Thus, in the following sentence from Macaulay's *Essay on Milton:* "Even when a system has been formed, there is still something to add, to alter, or to reject"—the logic of the sentence is not brought out by the punctuation. The reader should make a modulative break after the word "something," where no comma is placed, and he should, notwithstanding the separating commas, unite the three subsequent clauses by a modulative tie, to show their expletive nature, and the equal relation of each of them to their common antecedent. Thus: "There is still *something* | to add, to alter, or to reject."

In the following sentence from the same essay, no comma occurs, but the reader will nevertheless divide the period into at least three modulative clauses: "The blaze of truth and liberty | may at first dazzle and bewilder | nations which have become half blind in the house of bondage." Here the first section contains the *subject* of the sentence, the second the *predicate*, and the third the *object*, with its dependent clauses. It is to be observed that the object "nations" is separated from its governing verb "bewilder," only because the former is itself the governing antecedent to a new but subordinate sentence.

These illustrations are sufficient to show that the clausing of sentences for effective reading is dependent on a different principle from that which regulates punctuation.

Nor is any particular mode of vocal inflection necessarily associated with any of the marks of punctuation. This is particularly to be noted in connection with the sign of interrogation. The position of this mark, too, at the end of a period often misleads readers into an unnatural tone. The interrogative part of the sentence may not extend beyond a single clause, and this may be followed by many clauses within the same period. The mark of interrogation would therefore be better placed at the beginning of a sentence. But, as above shown, interrogative language may sometimes require for its just expression any one of all the tones in the gamut of speech. Thus: "Will you?" If pronounced with a simple rising tone, this question asks or appeals; and with an extended range of inflection, it expresses doubt or surprise. But the form of words does not necessitate the rising tone. Thus: "Will you?" If pronounced with a simple falling turn, the question expresses desire or expectation on the part of the speaker; and with an extended range of inflection, it conveys more or less of authoritative injunction.

The same question may legitimately, also, take either of the compound forms of inflection. Thus: "Will you?" If pronounced with a compound rising turn, it infers some cause of opposition or hindrance; and with an extended range of inflection, insinuates more or less of threatening or penalty. With a compound falling tone, thus: "Will you?" it suggests more or less of defiance and contempt, according to the pitch of the commencing turn, and the extent of the concluding inflection.

The principles of vocal expression, clausular pronunciation, emphasis, etc., as above sketched, apply equally to speaking as to reading; but it is in connection with the latter chiefly that they require to be studied, as they are generally applied instinctively in spontaneous speaking, even by those who are most enslaved by vicious habits in reading. The management of the voice, however, should be more than an instinct to the orator; and there is much in the philosophy of vocal expression that will be studied with equal advantage by both speakers and readers.

Extemporaneous speaking is greatly assisted by a good habit of elocution, and it is at the same time strongly conducive to the formation of such a habit. The deliberate utterance which weighs every phrase, gives the mind time to revolve its ideas, and choose the most effective words for their expression; and the evolution of a continuous train of thinking in coherent sentences compels deliberation and guarded delivery. But while the grandest triumphs of oratory are thus to be achieved, the requisites for success are such that great orators must ever be few in number. The ancient rhetoricians describe their model speaker as one who is accomplished in all knowledge, and esteemed for every virtue, and who has devoted more than the average duration of human life to laborious preparation; for they held that the oratorical faculty could not attain its full development and influence until hoary hairs had added the venerableness of age to a reputation for learning, sagacity, and unimpeachable morality.

Speaking from memory admits of the application of every possible element of effectiveness, rhetorical and elocutionary; and in the delivery of a few great actors, the highest excellence in this art has been exemplified. But speaking from memory requires the most minute and careful study, as well as high elocutionary ability, to guard the speaker against a merely mechanical fluency and thoughtlessly rhythmical utterance. This mode of delivery is therefore only appropriate to special efforts, for which due preparation can be made. Otherwise, memoriter delivery—as of sermons composed and learned at the rate of one or two every week—is altogether incompatible with excellence either of matter or of manner.

That the art of reading, which is on all accounts worthy of the highest position among the exercises of students for the oratorical professions, should be so utterly neglected in our systems of education, is a reproach to the enlightenment of our age; and it is especially a scandal to our universities, in which the examples of the famous orators of antiquity, and the lessons of their experience, are so fully known, yet practically dishonored.

REAL is a phrase much used in the law of the United Kingdom in combination with various other terms. In the law of England and Ireland real property or real estate, or realty, constitutes one of the great subdivisions of all property, consisting of what is popularly known as land and houses, which are not legal terms; personal property, or personalty, includes all the other kinds of property, as goods and chattels, money, etc. The same or a similar distinction pervades the laws of all countries. In the Roman law things were divided into movable and immovable. In the law of Scotland the division is into heritable and movable. The division into realty and personalty comes into operation in the event of the death of an owner of property, especially when he dies intestate, in which case his realty goes to the heir-at-law, and the personalty to his administrators or executors. See SUCCESSION. A division also exists in England of actions into real and personal actions, the object of the former being to recover real property, and of the latter to recover damages, or the possession of personal property; while there is also a class of actions called mixed actions, which partake of the nature of both. With regard to chattels there is also a subdivision into real chattels and personal chattels, the former consisting of contracts and interests affecting real estate, such as leases and mortgages, while personal chattels include corporeal movables. Then there is a division of assets into real assets and personal assets, the former being the real estate, so far as it can be made according to the rules of law liable for the debts of the deceased. In Scotland the word is also frequently used technically, though not in the same sense as in England. Thus, real actions in Scotland mean actions the object of which is to recover possession of the property itself, whether heritable or movable, and a real right is a right to the property itself in a like sense. A real burden, in the law of Scotland, means the right to a sum of money, or other obligation, so secured on land that the land cannot be sold or alienated except as subject to the burden, and until the burden is discharged.

REAL', a silver coin and money of account in Spain, Mexico, and other old Spanish possessions. It is the $\frac{1}{20}$ part of the piaster (*peso duro*), or $\frac{1}{4}$ of the *peseta*, the franc of the new Spanish decimal system, and has a value, varying with the exchange, of about 2½d. Of the old Spanish reals now disused, the *real de plata* was the $\frac{1}{8}$ of the piaster or *peso duro* (see PIASTER); and the copper-real or *real de vellon*, was the $\frac{1}{20}$ part of the piaster. The real was first coined in Spain in 1497, and has since that time frequently varied in value. At the present day, in Mexico, Peru, and the Central American republics, the piaster is divided into eight reals, and silver coins of one real are current, while in Colombia it is divided into 10 reals, and silver reals and half-reals are coined. The real is also a money of account in Portugal, being the equivalent of 40 reis; and in Batavia it is the name of a weight for gold and silver articles corresponding to 17 dwts. 14 grains troy weight.

REAL'GAR, a mineral consisting of about 70 parts of arsenic and 30 of sulphur. This native sulphuret of arsenic is of a very brilliant scarlet color, generally translucent, but sometimes transparent; and occurs in the vicinity of volcanoes, and in many igneous rocks; massive, disseminated, or crystallized. Its crystals are prisms, sometimes needle-like. It yields to the pressure of the nail.

RE'ALISM. See NOMINALISM.

REAL PRESENCE, in the Eucharist, a doctrine forming an article in the belief of the Roman, the Greek, and other eastern churches, and of some bodies or individuals in other Christian communions, according to which it is held that, under the appearance of the Eucharistic bread and wine, after consecration by the priest, Christ himself is really and substantially present, body and blood, soul and divinity. The word *really* is used in opposition to "figuratively;" and the decree of the council of Trent, which is the authoritative expositor of the Roman Catholic belief, conjoins with that word the terms "truly" and "substantially," the former being used in order to exclude the notion of a barely *typical* representation, such as is recognizable in the paschal lamb and the other Messianic types of the old law; and the latter for the purpose of meeting the view ascribed to Calvin, that Christ, as apprehended by the faith of the believer, was for such believer rendered virtually present in the Eucharist, and that his body and blood were received in virtue and efficacy, although not in corporeal substance. The belief of the Roman and eastern churches as to the reality of the presence, was shared by Luther, who, however, differed from Catholics as to the mode; and has always been followed also by one school of divines in the Anglican church, whose doctrine became very prominent in the time of Laud, and has been revived in the late Tractarian movement. But between Catholics and all the non-Catholic schools of whatever class, one marked difference exists. According to the former, the presence of Christ in the consecrated Eucharist is *permanent;* so that he is believed to be present not alone for the communicant who receives the Eucharist during the time of his communion, but also remains present in the consecrated hosts reserved after communion. On the contrary, all the Lutherans, and almost all Anglicans, confine their belief of the presence to the time of communion, and all, with hardly an exception, repudiate the worship of the reserved elements, as it is practiced by Catholics.

The question as to the *reality* of Christ's *presence* in the Eucharist is quite distinct from that which regards the *mode* of the presence, for which see TRANSUBSTANTIATION.

REAM, a certain quantity of paper, consisting of 20 quires, each quire containing 24 folio sheets. A *printer's ream* should consist of 21½ quires. The word appears to be derived from the Saxon *ream*, a band, and was probably applied in consequence of the bundle of paper being held together by a band.

REAPING, the act of cutting corn, has been performed from time immemorial with an instrument called a reaping-hook or sickle. The sickles in use among the ancient Jews, Egyptians, and Chinese appear to have differed very little in form from those employed in Great Britain. The reaping-hook is a curved instrument of about 1½ ft. in length, tapering from a breadth of about 2 in. at the butt-end, where it is fixed into a wooden handle. The edge is sometimes serrated, but, as a rule, it has long been made plain and sharp like a knife. In reaping, the harvester takes the corn in his left hand, and then with the hook cuts the stalks as close to the ground as possible; but when a grass crop has been sown down with the grain, the stubble is often left rather longer, in order to preserve the young grass. The corn is placed handful by handful in a band usually made of the corn, and when as much has been cut as will form a sheaf, it is tied up by the "bandster." The most expert reapers slash down the corn with the hook in the right hand, using the left merely to keep the corn from falling, until sufficient to make a sheaf has been cut, when the reaper places his hook under the corn, and supporting it with his left arm, deposits it all at once in the band. A bandster (one to every *three* or *four* reapers) binds the grain, and sets it up in stooks of generally 12 sheaves. It was surprising to see women of 60 years and upward handling the "hook" with great dexterity, accomplishing their 20 and sometimes 24 stooks of 12 sheaves each per day. After such a day's work, these women appeared much fatigued, but a night's rest seemed to set them on foot, vigorous as ever. They divested themselves of much of their clothing, and really worked hard for their money.

In the principal corn-growing districts of Scotland a great proportion of the reaping by hand was at one time done by laborers from Ireland, who undertook the work at from 8s. to 15s. per acre, with board and lodging in addition. Their fare was of the simplest kind—consisting, in the majority of cases, of porridge morning and evening, and bread and beer for dinner; their lodging at night was the barn or some outhouse, the farmer providing coarse blankets for covering. The quantity of porridge consumed at each meal by those people was sometimes astonishing—no less, as has been proved by actual weighing, than 5 lbs., with 1½ lbs. of milk besides. In England, most of the corn was cut by piece-work, at prices varying from 10s. to 18s. per acre. On the stronger lands of the midland and southern counties, the stubble is sometimes left knee-high, and afterward at leisure cut by the scythe, or with a long hook, at a cost of 2s. per acre. In Yorkshire, Derbyshire, Oxfordshire, and on many of the lighter soils in other counties, the operation of fagging or hacking, to be afterward noticed, was preferred as being more expeditious than reaping. A good hand cut down from one-third to one-half of an acre of wheat, and often consumed, during his long day's labor, two gallons of good ale.

The scythe, in some counties, more than thirty years ago, was preferred to the sickle. The most common varieties were the Hainault scythe—an importation from Belgium—the cradle scythe, and the common scythe fitted with a cradle. The Hainault scythe consists of a blade about 2 ft. 3 in. long, having a handle 14 in. long. This the mower holds in his right hand, while in his left he carries a hook, with a handle of about equal length. "The reaping," says the late Mr. Henry Stephens, in his *Book of the Farm*, "is done by pressing the back of the hook with the left hand against the standing corn, in the direction of the wind, and by cutting with the scythe close to the ground against the standing corn with a free swing of the right arm," the hook keeping the cut corn from falling until a sufficient quantity to form a sheaf has been cut. This operation was practiced in many parts of England, and especially on the lighter soils, under the name of fagging or hacking, the reaper sometimes using in his left hand, instead of the hook, a stout crooked stick from 2½ to 3 ft. long. Beans and oats were the crops most generally fagged. The cradle scythe is composed of a blade about 3½ ft. long, attached to a principal helve or sned about 4 ft. long, into which another helve of about 2½ ft.

in length is tenoned, thus making two handles. The cradle or bow is a piece of wood jointed to the heel of the blade, into which are inserted three or four wooden teeth, in a line with the blade, the object of which is to secure the grain being laid evenly in one direction. As skill at the working of the scythe, however, increased, the cradle or bow was discarded in many cases. By the scythe, corn can be cut at a rather less cost per acre than with the hook; but the work is not so neatly done. As nice a stubble will be left by a good hand with the scythe, and often nicer than by the hook. but the sheaves are not, as a rule, so tidy after the scythe, though they will stack rather earlier. Of a fair working crop, an adept at the scythe would cut 2 or 2¼ acres per diem. The average area cut per day with the scythe does not exceed 1¼ acres. In fact, if the crop is heavy, that extent is a very hard day's work. Those who contract for cutting the crops by the scythe obtain the services of the best men, and thus generally get about 2 acres per day reaped, and reaped very well too. In the midland and southern counties of England, the scythe, long in general use, was of larger size, and had only one long shaft, on which were fixed two handles. In Bedfordshire, Hertfordshire, and some of the eastern counties, the whole of the cutting, until the introduction of reaping machines, was done by these scythes. The harvest operations then, from the cutting of the crop to the thatching of the ricks, cost from 18s. to 25s. per acre.

The process of reaping with either the sickle or the scythe is, however, both tedious and expensive; and hence, during the last three-quarters of a century, many attempts have been made to accomplish the work by machinery—attempts which, in the course of the last 20 years, have been crowned with complete success. Reaping by machinery, however, is no modern invention. Pliny the elder, who was born early in the 1st c. of the Christian era, found a reaping-machine in Gaul. He says: "In the extensive fields in the lowlands of Gaul, vans of large size, with projecting teeth on the edge, are driven on two wheels through the standing corn by an ox yoked in a reverse position. In this manner the ears are torn off, and fall into the van." Palladius, about four centuries later, found a similar appliance for reaping corn in Gaul. He gives a more detailed but similar description of the machine.

In modern times the idea of a mechanical reaper appears to have originated with a Mr. Capel Lloft, who, in 1785, suggested a machine something after the pattern of the ancient one above described. Between that time and the great exhibition of 1851, in London, from which the general use of mechanical reapers may be said to date, the patents taken out for reaping-machines were very numerous. Among the most promising of these may be mentioned those of Mr. Gladstone of Castle-Douglas; Mr. Smith of Deanston; Mr. Kerr, Edinburgh; Mr. Scott of Ormiston; Mr. Dobbs, an actor in Birmingham; Mr. Mann of Raby, near Wigton; and the late rev. Patrick Bell of Carmylie, Scotland. In 1826 Mr. Bell constructed an efficient and simple machine, which long continued in use, and several features of which are observable in the reapers of the present day. The inventor of this, the first machine of the kind in Scotland, received a public testimonial from agriculturists, in consideration of the services he thus rendered to agriculture. In America Mr. Hussey and Mr. M'Cormick took out patents for reaping-machines of superior character in 1833 and 1834 respectively.

The movements of the cutters of these machines were various. A few were advancing only, some sidelong and advancing, others reciprocating and advancing, a large number continuous and advancing, and others continuous and alternate. The reciprocating and advancing motion is that now employed on the machines in use. The principal difference in the machines now so largely used for cutting corn is in the form and character of the cutters, and in the mode of delivering the grain after it is cut.

The cutting-knives are of two kinds—one, obtuse-angled and serrated; the other, acute-angled and for the most part plain. Both are attached to a bar, and are made to work through another bar of iron fitted with hollow fingers, called guard-fingers, which, projecting forward, catch the standing corn, and retain it firmly until it is cut. The serrated knife saws through it; the plain knife clips it, as it were; the finger-guard forming the fixed blade of the scissors.

The delivery of the sheaves is effected either by manual or mechanical labor; but the vast proportion of the machines in use are what are termed manual delivery-reapers. The delivery of the sheaves by manual labor is now almost at the back of the machine, the side delivery being generally abandoned, unless in the self-deliveries. In delivering the grain a man with a short-handled rake in his hand sits upon the machine almost opposite the cutting apparatus. With this he inclines the grain toward the knife; and when sufficient to make a sheaf has been cut, he rakes it off the platform upon the machine, on to which it has fallen, and deposits it on the ground. In making a neat and squarely-formed sheaf, the raker is greatly assisted by a hinge in the platform, which enables him, by pressure of the foot, to tip the board over, so as to let the corn slide gently down. With the back-delivery the sheaves must be tied up and removed out of the way of the machine before it comes round again Such a reaper, therefore, always requires a full supply of hands to attend upon it. But it is the best for all that. It does require a skillful, careful man to "tilt," but the fact that the course has to be kept clear for the horses every round spurs the laborers, who thus do more work than they would otherwise accomplish. Besides, it is a very doubtful advantage to be enabled to slash down the crops irrespective of the gathering capacities. Moreover, with the self-deliveries it is the distance gone over, and not the quantity of crops collected, that regulates the size of the sheaf. With uneven crops this is an inconvenience. Sheaves of different sizes are very troublesome in the stook. They will not stand well, and in stacking it is difficult to keep uniformity in building. Large and small-sized sheaves are not equally dried, and are not ready for stacking at the same time. Eight people "lifting" after the manual-reaper will do as much work as nine following the self-delivery, so that the saving of a man's labor claimed by the self-delivery is doubtful. The sheaves are rather better formed by the manual machine than by the self-delivery. Each kind has, however, and will likely continue to have its advocates, though the preponderance is in favor of the manual.

The mechanical or self-delivery machines, as they are generally called, are of two kinds—one lays the cut corn in swaths, the other deposits it in sheaves. The latter is decidedly the best and most fashionable of the two.

The automaton sheaf-deliverers best known to the public are those of Samuelson of Banbury; Hornsby & Son; Burgess & Key; Brigham & Bickerton, Berwick; Howard & Co., Bedford. We give a description of Samuelson's sheaf-deliverer (largely used in Great Britain). The self-delivering machinery consists of a series of four rakes—two toothed, and two plain—attached to an upright shaft, in such a manner as to admit of a free ascending, descending, and horizontal motion. The two toothless rakes, or "dummies," are shorter in the arms by 6 in. than the other two, and are merely employed to incline the grain toward the cutter. The platform upon which the grain falls after it is cut is of quadrant shape, and is surrounded, on the outer edge, by a rim of about a foot deep. The side of the *cam* next the platform is bent or depressed, so that the rakes on reaching this point, make a sudden fall, or eccentric motion, thus assuming the horizontal attitude necessary to sweep over the platform on the level. The rakes are adjusted so as to lay the sheaves about 12 ft. apart, to the side, and out of the way of the horses. This machine has a double-throw knife—an arrangement which reduces the driving speed, and consequently the wear and tear of the machinery.

In M'Cormick's automatic delivery-machine, a rake is so used that "during one part of the revolution of the gathering-reel it acts as one of the vanes of the reel in bending the standing corn to the cutting-blades. When the rake reaches the cutting-blades in front of the platform, it ceases to revolve around the reel-shaft (which continues its rotary motion), and is made to move horizontally upon a vertical hinge, to which one end is attached (the points of the teeth being near the surface of the platform), sweeping the cut corn off at the side, and depositing it on the ground in sheaves ready for the binder." The Messrs. Brigham & Bickerton's improved machine has a deep upright board of sheet-iron to keep the corn on the platform. Iron rods on these sheets separate the corn. This firm has thrown off two branches lately. The first off-shoot was Messrs. Lillie & Elder, and the last was Bickerton & Co. The three firms make good serviceable reapers. Howard's and Hornsby's reapers are substantially and simply constructed, embracing slight improvements every other year, formed on experience. Prices range from £20 to £35.

The makers of manual delivery-machines are numerous, including in a prominent degree Kemp, Murray & Nicholson, Stirling; Jack & Sons, Maybole; Harrison, Macgregor & Co.; Pickslev, Sims & Co.; Ransome, Sims & Head, Ipswich; Samuelson & Co., Banbury; J. & F. Howard, Bedford; and many others of fame. The manual delivery-machines of the first-named firm are very popular, strong, and ingeniously manufactured, while those of the Maybole firm are not quite so strong, but work with great ease and tastefulness. Carefully handled, the manual delivery-reaper will take up laid and twisted crops admirably. Indeed, all the reapers nowadays, perfected as they are year by year, now do their work remarkably well, leaving a beautiful stubble and a nice sheaf. The sheaves from the reaper, however, are not so easily dried for the stackyard as those from the scythe, but they defend rain better, and are altogether preferable. The number of reapers now in use in Great Britain is enormous, and is growing rapidly every year. They are a most decided improvement. Indeed, they are one of the most valuable introductions that have been made in rural agriculture in this country. At almost every farm of ordinary or even comparatively small dimensions, there is a reaper, and three or four engaged on the larger holdings. The cost of the manual delivery ranges from £18 to £30.

The cost of reaping by machinery is much less than either by scythe or sickle. Mr. Wilson of Woodhorn, Morpeth, found that the cutting of wheat with the sickle (binding and stocking included) cost him from 11s. to 15s. per acre, and with the scythe 8s., while with the machine it only cost him 5s. 9d., exclusive of wear and tear. From data supplied by a large number of their customers, Messrs. Samuelson & Co. make out that the saving by mechanical over hand labor is, as compared with reaping, 4s. per acre, and with mowing, 1s. 9d. per acre; and most farmers who have tried reaping-machines set down the saving at from 20 to 30 per cent. Besides, there is about a like economy in time, which is of immense importance in a variable climate like that of Great Britain.—See Woodcroft's *Appendix to Patents for Reaping-machines;* Mr. Jacob Wilson's "Essays on Reaping-machines," in *Transactions of Highland Society* for January, 1864; *Book of Farm Implements,* and *Book of the Farm,* by Henry Stephens; J. C. Morton's *Cyclopædia of Agriculture.*

REAPING (*ante*). Pliny the elder, A.D. 33, describes in Gaul a cart fitted with stationary combs, tearing off the grain and abandoning the straw; and Palladius describes the same, 391, unchanged in three centuries, but in its reversely yoked cattle and elevated platform foreshadowing the modern header.

The modern reaper, originating with Mr. Capel Lloft in 1785, suggesting a machine little in advance probably of the ancient "comb," received its first legal recognizance in 1799, in England. Various inventors followed; and in 1826 the rev. Patrick Bell, in Scotland, built, and during 1828 and 1829 worked successfully, a simple machine, pushed by horses, and cutting by a series of scissors, and moving the grain into swaths continuous around the field, by an inclined sidewise-moving apron. Used from 1828 to 1832 in Scotland, a single specimen was imported and tried by John B. Yates, at Chittenango, N. Y., in 1835. Its main feature, the sidewise-moving apron, is used in a modified form to-day. Before 1832 only eight U. S. patents were granted; and previous to Bell, Hussey, and McCormick, all were merely experimental.

Obed Hussey in 1833 invented the reciprocating angular wave-edged knife, serrated now for reaping, smooth for mowing, and moving as one blade of a pair of scissors in as many stationary blades—double fingered, embracing the sickle above and below—as there were projections or serrations in the sickle. His reaper was tried in Hamilton county, Ohio, in 1833, and patented in the same year. Following him, in 1834, C. M. McCormick, formerly of Virginia, now of Chicago, patented a reaper; farther improved by him in 1845 and 1847, and in all adopted Hussey's knife; but since the Hussey reaper, carrying a platform and support for the raker, raked directly rearward, the improvement of Seymour of Brockport, and Palmer and Williams in 1851, changed the platform to a quadrant shape, and employed a vibrating rake, from the center of the platform circle. After this Bell's machine again appeared in competition, in England, with Hussey's and McCormick's, in 1853. Following these. Dorsey of Maryland in 1856 added to the rake over the quadrant platform three additional arms, and made its motion continuous; and following him, Samuel Johnston of Brockport, N. Y.. placed rake teeth on each arm of the Dorsey rake, and a double cam guide-way to the pivot head. Thus the reel was abandoned, only continuing to be used with some special machines; but from the invention, in 1858, of the C. W. and W. W. Marsh harvester—a simple addition of an elevating device and raised table for reception of grain—the use of the reel revived. Many varieties—notably the McCormick, Elward, and Adams and French (vibrating slats to shift the grain step by step as an apron and elevator)—have all had as an object the carrying of manual or mechanical binders; the latter using wire and cord, and freeing the former human binder for other labor. The wire binders have been proved injurious in leaving wires to go through threshing. The string binder, largely experimental, is destined to receive great favor; and every firm building grain-harvesting machinery projects one. In mowers, simply cutting, the Wheeler type, invented 1854; the Buckeye, of the same year, invented by Aultman and Miller; and the Ball type, all aim at flexibility. Ketchum and Kirby originated the one-wheel class of machine.

REASON—REASONING. The word reason denotes that function of our intelligence having reference to the attainment of a particular class of truths. We know a great many things by immediate or actual experience. Our senses tell us that we are thirsty, that we hear a sound, that we are affected by light. These facts are truths of sense, or of immediate knowledge, and do not involve the reason. Reason comes into play when we know a thing not immediately, but by some indirect process; as when, from seeing a river unusually swollen, we believe that there have been heavy rains at its sources. Here the mere sense tells us only that the river is high; it is by certain transitions of thought, or by the employment of our thinking powers, that we come to know the other circumstance, that in a remote part of the country there have been heavy rains.

In ascertaining these truths of reason, or of inference, as they are called, there are various steps or operations, described under different names. Thus we have (1) DEDUCTION, OR SYLLOGISM; (2) INDUCTION; and (3) GENERALIZATION of notions, of which ABSTRACTION and DEFINITION are various phases. These are described under their several designations. The nature of the function or faculty denominated reason or the reasoning faculty can be explained by showing how it results from the fundamental powers of the intelligence. See ASSOCIATION OF IDEAS.

There is another and peculiar signification attached to the word reason, growing out of the philosophy of Kant. He maintained the existence of certain principles or cognitions *à priori*, or of intuitive origin, and not derived from experience, such as cause and effect, the axioms of mathematics, etc. See COMMON SENSE. It was a function of the reason, according to him, to recognize those principles; while the generalizations of mere experience, as that water extinguishes fire, were proved by the understanding. Other philosophers give the name "noetic faculty" (Greek, *nous*) to the same function. Hamilton calls it the "regulative faculty."

REAUMUR, RENÉ ANTOINE FERCHAULT DE, a celebrated naturalist and physicist, was born at La Rochelle, in the department of Charente-Inférieure, France, Feb. 28, 1683; and studied in the Jesuits' college at Poictiers, and afterward at Bourges. With an eye observant of facts of every kind, and an indiscriminate thirst for information, he yet specially devoted his attention to physics, natural history, and mathematics. In 1703 he went to reside at Paris, where he speedily attracted general attention by the publication of three geometrical memoirs on particular cases of the intersection of lines; and in 1708 he was elected a member of the academy of sciences, and was charged with the supervision of the work *Description des divers Arts et Métiers*, published under the auspices of the government. Réaumur lightened his labors with occasional researches into various subjects of natural history. These researches occupied him from 1708 to 1715, and were followed by a series of investigations into the condition of the woods, gold-bearing rivers, and turquois mines of France. His investigations into the nature of the turquoises of Languedoc led him to the discovery, that they consisted of the fossil teeth of extinct animals. The collections of memoirs of the academy of sciences from 1723 till 1725 contain a number of papers by Réaumur, in which he details his discoveries of the mode of producing steel from iron (an art till that time unknown in France), of the tendency which fused metals have to become crystallized, and of the mode of tinning iron (also till that time unknown in France). For these brilliant and valuable successes, he received from the French government a sum of 12,000 livres, which he spent in promoting and encouraging the industrial arts in his native country. Réaumur's volatile genius next prompted him to take up the subject of pottery; and here also his ingenuity and perseverance were rewarded with success, for though he failed in successfully imitating the porcelain of China, he succeeded in producing (1739) an opaque glass, which was equal to the porcelain of Saxony and Japan. All this time he occasionally pursued his studies in natural history, at one time propounding a mode for preserving eggs (by coating them with fat), at another giving directions for the production of fowls by artificial incubation. His invention of the *thermometer* (q.v.) which bears his name need not be more than mentioned here. He died of a fall from a horse at his estate of Bermondière, in the department of Maine, Oct. 17, 1757, leaving behind him a voluminous collection of works on all the subjects above stated, also a treatise on "the silk of spiders," which was translated into Manchu by the command of the emperor of China; and a number of memoirs (1731–40), containing his thermometric researches on air, and on mixtures of fluids with fluids or solids. But by far his most important work is the *Mémoires pour servir à l'Histoire des Insectes* (Amsterdam, 12 vols. 1737–48), which embodies a number of original observations and discoveries concerning the habits and instincts of insects, sufficient of itself to immortalize their author. Only six volumes of this work have been published, the seventh being very incomplete at the period of the author's death. While collecting materials for this great work, he kept numerous insects of all kinds in his garden, in order to have every opportunity for observing them. The academy of sciences obtained, by the terms of Réaumur's will, his collections of minerals and plants; materials for a history of quadrupeds and birds, afterward made use of by Brisson and Buffon; a history of arts, in MS.; and an immense number of finished and unfinished MS. memoirs.

REBATE, a longitudinal groove, cut in a piece of timber, to receive the edge of another piece, or the ends of a number of pieces of wood. A notch, such as that in a door standard for the door, is also called a rebate. In masonry, such a joint is called a joggle.

REBAT'ED, in heraldry, having the points broken off or cut short.

RE'BEC (anciently *rubèbe*, or *rebelle*, Arabic, *rébab*), an ancient musical instrument of the violin kind, of which the body, instead of consisting of two hemispherical enlargements, like other instruments of the same tribe, was narrow toward the neck, and gradually enlarged till it rounded off at the lower end. It had a bridge and three strings tuned in fifths, and was played with a bow. The earliest known representation of the rebec, however, taken by the abbé Gerbert from a MS. of the 9th c., gives it but one string. The Moors introduced this instrument from the east into Spain, whence it spread over the rest of Europe, and was the precursor of the violin. The four classes of rebecs, treble, alto, tenor, and bass, were favorite instruments of the minstrels of the middle ages, and were used both for the dance and to accompany street-singing. Milton, in his *L'Allegro*, characterizes this instrument as the "jocund rebec."

REBELLION (Lat. *rebellio*, from *bellum*, war, a revolt by nations subdued in war), an openly avowed renunciation of the authority of the government to which one owes allegiance, or a levying of war to resist the authority of the government. Unlike insurrection, which may be merely an opposition to a particular law, rebellion involves a design to renounce all subjection to the state. *A commission of rebellion* is a commission awarded against a person who treats the sovereign's authority with contempt, by not obeying his proclamation according to his allegiance, and refusing to attend his sovereign when required. It consists of four commissioners, who are ordered to attack the rebel wherever found. In Scotland, by a legal fiction, a debtor disobeying a charge on letters of horning to pay or perform in terms of his obligation, was accounted a rebel, as being disobedient to the sovereign's command contained in the writ. This disobedience was called civil rebellion, and the penal consequences of actual rebellion followed it, until they were abolished by 20 Geo. II. c. 50. By the old form of diligence (which is still competent), it has therefore been said that debtors were imprisoned not for debt but for rebellion. This fiction was discarded in the provisions of the statute 1 and 2 Vict. c.

114, simplifying the form of diligence and the steps by which imprisoment for debt is effected.

The expression "the great rebellion," is generally applied in England to the revolt of the Long parliament against the authority of Charles I. It began with the votes of the two houses regarding the militia in 1642, by which they endeavored to seize the military power of the country, and the departure of the king for York, which was immediately followed by the breaking out of hostilities. The civil war was, properly speaking, terminated by the submission of Charles to the Scots, in April, 1646; but the period of the rebellion is usually held to include the commonwealth or protectorate, and and to extend to the restoration of Charles II. in May, 1660.

The revolts in behalf of the house of Stuart in 1715 and 1745 are often, particularly in Scotland, spoken of emphatically as "the rebellion." The former rising in favor of the chevalier de St. George, son of James II. of England, called the old pretender, was headed by the earl of Mar, and put down in 1716: the latter was led by prince Charles Edward, known as the young pretender, who, landing in the Hebrides, was joined by the Highland chieftains and numerous followers, and after taking possession of Edinburgh, and marching to Derby, retreated into Scotland, and was defeated with great slaughter by the duke of Cumberland at Culloden, April 16, 1746.

REBELLION, WAR OF THE, the conflict between the northern and southern states of the union in 1861–65; ostensibly and immediately occasioned by disagreement between the two sections on the subject of slavery, but perhaps not less the result of long-standing political and economical differences, and of a general failure to assimilate on the part of the northern and southern people. The question of slavery had rested for 10 years after the Missouri compromise of 1821; but the formation of anti-slavery societies in the north in 1832, and the public agitation which followed, led by Arthur Tappan, William Lloyd Garrison, Wendell Phillips, and other prominent abolitionists, aroused a strong public sentiment in opposition to slavery. This sentiment found expression in the nomination of anti-slavery candidates for the presidency and vice-presidency at each election from 1840; by the introduction into congress of the "Wilmot proviso" in 1846; and by the John Brown raid at Harper's Ferry in 1859; while the opposition which it created was signified by the repeal of the Missouri compromise act in 1854; the "Dred Scott" decision in the U. S. supreme court in 1857; and the adoption of the Kansas (Lecompton) constitution of 1858. The John Brown affair (see BROWN, JOHN) had greatly intensified popular feeling north and south; and at the presidential election of 1860 four candidates were in the field: Stephen A. Douglas of Illinois, and John C. Breckenridge of Kentucky, nominated by the two wings of the democratic party; John Bell of Tennessee, nominated by the so-called "union," or compromise party; and Abraham Lincoln of Illinois, nominated by the republican party. The election was hotly contested, and during the campaign both sections were excited to fever heat by the powerful addresses made by the leading political speakers of all parties. Abraham Lincoln was elected president; the vote being: Lincoln, electoral 180, popular 1,857,610; Douglas, electoral 12, popular 1,365,976; Breckenridge, electoral 72, popular 847,952; Bell, electoral 39, popular 590,631. The result of the election was to precipitate rebellion. Nov. 7 the legislature of South Carolina called a state convention to consider the propriety of seceding from the union. This convention met at Charleston, Dec. 17, and on the 20th passed "an ordinance to dissolve the union between the state of South Carolina and other states united with her, under the compact entitled the constitution of the United States of America;" declaring that "the ordinance adopted by us in convention on the 23d day of May, in the year of our Lord 1788, whereby the constitution of the United States was ratified, and also all acts and parts of acts of the general assembly of the state ratifying amendments of the said constitution, are hereby repealed; and that the union now existing between South Carolina and other states, under the name of the United States of America, is hereby dissolved." This example was followed by secession acts similarly phrased, passed by the different southern states in the following order: Mississippi, Jan. 8, 1861; Florida, Jan. 10; Alabama, Jan. 11; Georgia, Jan. 19; Louisiana, Jan. 26; Texas, Feb. 1; Virginia, April 25; Arkansas, May 6; North Carolina, May 20; Tennessee, June 8. The avowed reasons for this course on the part of the states named were: "the refusal of fifteen of the states, for years past, to fulfill their constitutional obligations;" and "the election of a man to the high office of president of the United States, whose opinions and purposes are hostile to slavery." The states of Kentucky and Missouri were divided in sentiment on the question of secession, and thereafter had representatives in the governments and armies of both sections. Feb. 4, 1861, a congress met at Montgomery, Ala., in which were represented all the states which had passed ordinances of secession previous to that date. This congress adopted for the new organization of states a constitution, and the title "Confederate States of America." Jefferson Davis, of Miss., was elected president, and Alexander H. Stephens, of Georgia, vice-president, of the new confederacy. In the mean time the state forces of South Carolina had seized the U. S. custom-house, post-office, and arsenal in Charleston, and had taken possession of forts Pinckney and Moultrie in the harbor of that city; maj. Robert Anderson, in command of fort Moultrie, with a force of only 80 men, having withdrawn to fort Sumter, which he considered more defensible. April 12, 1861, hostilities began with the bombardment of fort Sumter, which, after a brave defense, although several times set on fire by missiles, was surrendered on the 14th by maj. Anderson—the small garrison marching out with the honors of war. On the day following this event president Lincoln issued a proclamation calling for 75,000 volunteers for three months; and on May 3 a second call for 64,000 men for the army, and 18,000 for the navy, to serve "during the war." The U. S. regular army consisted Jan. 1, 1861, of 16,402 officers and men; but these had been dispersed by Mr. Floyd, secretary of war under Buchanan, to the most distant parts of the country. Under his directions, also, vast quantities of arms and ammunition had been transferred from northern to southern arsenals during 1860; and the ships of the U. S. navy were mostly absent on foreign stations. It is to be observed here also that a very large proportion of the southern army officers resigned and entered the confederate service; this course was by no means so general on the part of southern born officers in the navy. In the southern states preparations for war were carried on with great energy. Gen. Robert E. Lee was appointed commander-in-chief of the confederate forces in Virginia, their main body being concentrated at Manassas Junction (Bull Run). The Mississippi river was blockaded by the confederates at Memphis, Tenn., May 10; the president of the United States proclaimed a blockade of all southern ports April 19; on June 10 a union force was repulsed by the confederates at Big Bethel, Va.; and on July 21 was fought the first battle of Bull Run, when the confederates, about 30,000 strong, under gens. Johnston and Beauregard, defeated the federals, in about the same force, under gen. Irwin McDowell, and threatened the capital. The union loss was 481 killed, 1011 wounded, 1460 missing; the confederates lost 378 killed, 1489 wounded, 30 missing. This was the first important battle of the war, and its effect was to rouse both sides to their uttermost, for what was now understood to promise a long and bloody struggle. Meanwhile, gen. George B. McClellan had succeeded in wresting the western portion of Virginia from the confederates; and, on the day following the disastrous defeat at Bull Run, he was appointed commander-in-chief of the army of the Potomac. His skill in organizing and disciplining large bodies of men, and making valuable soldiers out of raw and inexperienced recruits, doubtless qualified that army for the magnificent part it afterward took in the war. The congress of the United States met in extra session July 5, 1861, and the president called for men and money. To this congress responded by voting half a million men and $500,000,000. At the south the enlistment of 400,000 men was going on under a call from the confederate congress. The northern states in their individual capacity had before this period drawn upon their own resources in behalf of the union cause: New York and Pennsylvania each voting $3,000,000 for the prosecution of the war; Massachusetts and other New England states sending regiments into the field fully armed and equipped; while in every city, town, and hamlet volunteers were gathering and forming themselves into companies and regiments, to be afterward offered to the governors of the respective states, and through those officials to the country. The latter half of the year 1861 was devoted mainly to organization, and the engagements that occurred were generally without great importance. The confederates had possession of the U. S. arsenal at Harper's Ferry and the navy-yard at Norfolk, Va., where they had seized 2,000 cannon and the steam-frigate *Merrimack*, one of the finest in the U. S. navy. Oct. 21 they gained a success by almost annihilating the union force of 1500 to 1700 men under gen. Charles P. Stone and col. E. D. Baker, which had been sent to Ball's Bluff on the Potomac, and left there unsupported. Nov. 7 gen. U. S. Grant, after having seized Paducah, at the mouth of the Tennessee river, and another important strategic point at the mouth of the Cumberland, captured the confederate camp at Belmont, Mo., and thus checked the advance of gen. Jeff. Thompson with a rebel force in that direction. On the same date a U. S. naval force under admiral Dupont captured forts Walker and Beauregard at Port Royal, S. C. The following day became important in history as that in which the confederate commissioners Mason and Slidell were taken by capt. Wilkes of the U. S. frigate *San Jacinto* from the British mail steamer *Trent*, while on their way to their respective missions to England and France. This act, which was near involving the United States in a war with Great Britain, was disavowed by the U. S. government, and the envoys were surrendered, thus averting the danger. The union force in the field in the beginning of 1862 was about 450,000 men; the confederate force numbered about 350,000. During January some slight successes were gained in Kentucky, at Prestonburg and Mill Spring, by the federals under col. Garfield and gen. Thomas. Gen. Grant, aided by a naval force under commodore Foote, captured fort Henry on the Tennessee river Feb. 6; and ten days later gen. Grant attacked fort Donelson, on the Cumberland, which surrendered with 12,000 prisoners and 40 cannon. A naval expedition under gen. Burnside and commodore Goldsborough captured Roanoke island, New Berne, N. C, and Beaufort, between Feb. 8 and April 25. Mar. 9 occurred the remarkable naval engagement between the floating battery *Monitor* and the confederate iron-clad *Virginia* (formerly the *Merrimack*), resulting in the defeat of the latter off fortress Monroe, and her hasty retreat to Norfolk. This experiment with the *Monitor* was followed by the construction of a fleet of vessels after the same model by the U. S. government. On Mar. 8 occurred the battle of Pea Ridge, in western Arkansas, which lasted three days, in which the federals under gen. S. R. Curtis defeated the confederates under gen. Earl Van Dorn. April 6 gen. Grant was defeated at the battle of Shiloh, being driven to the Tennessee river; but renewed the battle with victory on the following day. On the same date gen. Pope and commodore Foote captured Island No. 10, in the Mississippi river, with 8,000 prisoners. Fort Pulaski, near Savannah, Ga., was bombarded and captured by maj. Gillmore April 11; and in this month the first attacks on the forts below New Orleans were made by admirals Farragut and Porter. The army of the Potomac, which had devoted its time during the winter of 1861–62 to organization, moved early in the spring to the peninsula formed by the James river and Chesapeake bay and gained the important battle of Williamsburgh in May, the evacuation of the town and works being the result of the attack by gen. Hancock, then in command of two brigades, and who bore the brunt of the fighting. After this battle the army of the Potomac advanced up the peninsula to the Chickahominy, and fought the desperate battle of Fair Oaks on May 31, which was a union victory; but the approach of Stonewall Jackson to co-operate with Lee made it necessary in the judgment of McClellan to effect a change of base to the James river, and this hazardous movement was accomplished at the expense of a series of the hardest fought engagements of the war—those of Oak Grove, June 25; Mechanicsville, June 26; Gaines' Mill, June 27; Savage Station, June 29; White Oak Swamp, June 30; and Malvern Hill, July 1. As a result of the peninsula movement and "the change of base," the advantage remained with the confederates, who had successfully defeated the original plan for the capture of Richmond by this route. Aug. 29–30 occurred the second battle of Bull Run, between the union forces commanded by gen. John Pope and the confederates under Lee, Jackson, and Longstreet. Pope was utterly defeated, and his broken and dispirited columns driven back upon Washington, the union losses being about 11,000 and the confederate 8,000. McClellan, who had been removed from his command, in favor of Pope, was now hastily recalled; and on Lee advancing into Maryland, defeated and routed him at South Mountain and Antietam, Sept. 14 and 17, and Lee was driven across the Potomac. Harper's Ferry, which had been evacuated by the confederates in June, 1861, was recaptured by Stonewall Jackson Sept. 15, 1862, when 11,583 men and a vast quantity of munitions of war fell into the hands of the confederates. Nov. 7, gen. McClellan was superseded by gen. Burnside, by order from Washington and against the wish of the latter; and Burnside was immediately defeated disastrously at Fredericksburg, Va. (Nov. 13), with a loss of 12,000 men. On Jan. 25, 1863, gen. Burnside was relieved by gen. Hooker, who was defeated at Chancellorsville, May 2–4, losing more than 11,000 men. Lee followed up his success by invading Maryland again, and early in June made a descent on Pennsylvania. June 28, Hooker was relieved from the command of the army of the Potomac, which was bestowed on gen. George G. Meade, and the latter at once pursued the confederates with such celerity and determination, that Lee was forced to stop and give battle. The field of the battle of Gettysburg was appointed by gen. Hancock, at the request of gen. Meade that he should use his own judgment as to the best spot to fight. Meade's own preference was for Pipe-clay creek, some distance away from the chosen field. Gen. Hancock commanded the left-center of the line during the battle, which lasted July 1–3, and was shot from his horse on the last day, and dangerously wounded. Gen. Reynolds was shot in the first day's fight, and instantly killed. The result of the three days' battle was a complete union victory, there being between 70,000 and 100,000 engaged on either side: the loss of the confederates 36,000; the union loss 23,190. The rapid movement and skillful generalship by which gen. Meade intercepted gen. Lee, and forced him back into Virginia, may be esteemed among the most brilliant acts of the entire war. Lee, having recrossed the Potomac, now retreated to a position on the Rapidan, and strategic movements on the part of the two armies occupied the time until winter, accompanied by occasional heavy skirmishing.

In the west, during 1863, Memphis and Vicksburg had fallen, the latter almost at the moment of the decisive victory of Gettysburg, and gen. Grant, in command of the army of the Mississippi, was beginning to achieve his position as the leading soldier of the war. Gen. Morgan was raiding in Indiana; Rosecrans had driven the confederates under gen. Bragg from middle Tennessee, and over the Cumberland mountains; the federals had been defeated at Chickamauga, and the rebels at Lookout mountain and Missionary ridge; and the union forces held Missouri, Arkansas, Kentucky, Tennessee, a large part of Louisiana, Mississippi, and Florida, and the Rio Grande frontier of Texas, and had control of the Mississippi river. A draft in the northern states for 300,000 men, with an exemption clause, had added 50,000 men to the union armies, and the sum of $10,518,000 available for bounties.

The year 1864 opened with a slight advantage on the side of the confederates. Certain Red river expeditions under gens. Banks and A. J. Smith proved disastrous to the federal forces engaged, admiral Porter being in danger of losing his fleet below Shreveport. Farragut with gen. Butler had captured New Orleans in the spring of 1862—a brilliant naval achievement; the latter had also taken Natchez; and in Aug., 1864, Farragut rounded off his career of splendid service in the war by reducing the forts at the entrance of Mobile bay, and destroying the confederate fleet. Gen. Grant had been made lieut.gen. and commander-in-chief in March (1864); had turned over his command in the west to Sherman, and taken command of the army of the Potomac; and now a combined movement against the confederates, east and west, was to be made under the personal direction of these two great generals. Sherman's army was in motion from

Chattanooga by May 7, and forced gen. Johnston and afterward gen. Hood through Georgia, as far as Atlanta, defeating the confederates at every point. A siege of the fortifications of Atlanta, which lasted two months, finally placed Sherman in possession of that city. In the meantime the army of the Potomac, with gen. Meade in immediate command, had broken camp on the Rapidan, and undertaken the tremendous campaign of the "Wilderness," with the design of forcing the fighting straight to Richmond. During this campaign of 43 days, more than 100,000 men on each side, with constant re-enforcements, were engaged almost continuously in the battle of Spotsylvania court-house, the sharp engagements on the North Anna, and the disastrous defeat of the union army at Cold Harbor, until, on the night of June 12, the army of the Potomac crossed the Chickahominy and took position on the s. side of the James river. The design of this movement was to threaten Richmond by way of Petersburg, and to thwart it. Lee at once threw a large portion of his army within the defenses of the latter city, which proved to be impregnable to assault, and only to be reduced by regular approaches and a skillful siege. While this siege was being conducted, gen. Sherman had made his now celebrated "march to the sea," carrying his compact army of 60,000 men from Atlanta through the heart of Georgia, leaving the former city on Nov. 15, and reaching Savannah on Dec. 10; carrying fort McAllister by assault on the 13th, and occupying Savannah itself on the 20th. While Sherman was thus successful, the confederate gen. Hood had invaded Tennessee, driving the federal forces under gen. Thomas from point to point, until finally himself defeated near Nashville, Dec. 15, with a loss of more than 13,000 prisoners and 72 pieces of artillery.

The presidential election in 1864 found Abraham Lincoln renominated by the republicans, and gen. McClellan by the democrats. Twenty-five states took part in this election; the electoral vote was 233, of which Lincoln received 212; the popular vote of Lincoln and Andrew Johnson of Tennessee, was 2,223,035, and that of McClellan and Pendleton 1,811,714. During December and January gen. Sherman had remained in Savannah, resting his troops; but on Feb. 1, 1865, he again took the field. Marching through South Carolina, he took possession of Columbia; and on the following day, Feb. 18, Charleston surrendered to the union force under gen. Gillmore, which had been engaged in the siege of that city since July 10, 1863, during which time it had been under bombardment 542 days. Sherman now pushed on into North Carolina, while two other union armies, under Schofield from New Berne, and Terry from Wilmington, co operated with him; the three armies meeting at Goldsborough, N. C., Mar. 22, while gen. J. E. Johnston, with the main army of confederates in that region, was being held at bay at Raleigh. On Mar. 24 gen. Grant issued an order for a combined movement of the armies operating against Richmond, to take place on the 29th. But on the 25th gen. Lee made a desperate attempt to break through the federal lines on the Appomattox river, and fort Steedman was captured by the confederates, but soon retaken. April 1 gen. Sheridan defeated the confederates at Five Forks—which protected the South-side railroad, and thereby Lee's connections with Richmond—and captured 6,000 prisoners. This was the final and irretrievable blow to the confederate army. On the following day, April 2, gen. Grant attacked along the whole line in front of Petersburg, and on the evening of that day both Petersburg and Richmond were abandoned. Gen. Lee retreated toward Lynchburg, but was intercepted by Sheridan, and on April 9 surrendered his army to gen. Grant at Appomattox Court-house. Gen. Johnston surrendered his army on April 26; on May 4 gen. Taylor surrendered the confederate forces in Alabama to gen. Canby; and the last fight of the war of the rebellion took place May 13, 1865, on the Rio Grande, in Texas, between col. Barrett, in command of the federals, and gen. Slaughter, confederate, in which, strangely, the confederates were victorious. The last confederate army in the field—the trans-Mississippi—was surrendered by Kirby Smith on May 26. The number of union soldiers in the field during the war was 2,666,999; the number drafted and held to service being 46,347; furnished substitutes, 73,607; paid commutation, 86,724; total drafted, 206,678, to which should be added 87,588 credited to the states under the draft of 1862; making in all drafted, 294,266. The amount of commutation moneys received by the government was $26,366,316.78; the amount of bounties paid by the U. S. government was $300,223,500; by state and local authorities, $285,941,036. The casualties in the army numbered 280,739: 5,221 officers and 90,868 men killed in action or died of wounds; and 2,321 officers and 182,329 men died from disease or accident. The entire available force capable of active service in the field, enrolled in the confederate armies, was 600,000 men; their entire loss during the war was more than one-half this number.—During the war confederate cruisers, fitted out mostly in British ports, scoured the ocean, doing irreparable damage to the commerce of the United States. Among these, the most prominent were the *Alabama*, *Florida*, *Georgia*, *Sumter*, and *Tallahassee*. The *Alabama*, Raphael Semmes commanding, was sunk off Cherbourg, in France, June 19, 1864, by the U. S. S. *Kearsarge*, commanded by capt. Winslow. After the evacuation of Richmond, Jefferson Davis, president of the confederacy, fled south, and was captured May 10, 1865, at Irwinsville, Ga., by gen. Wilson's forces, as he was attempting to make his further escape in disguise. In company with certain others of the prominent leaders of the rebellion, he was imprisoned for a time; but no man was eventually punished for participation therein.—The most important political act of the rebellion was the "emancipation proclamation," issued Jan. 1, 1863, which gave freedom to 4,000,000 of slaves. Its most characteristic infamy was the assassination of Abraham Lincoln on the night of April 14, 1865.

RE'BUS, an enigmatical representation of a name or thing by using pictorial devices for letters, syllables, or parts of words. The term probably originates from the device speaking to the beholder *non verbis sed rebus*. Devices of this kind, allusive to the bearer's name, were exceedingly common in the middle ages, particularly in England. In many instances, they were used by ecclesiastics and others who had not a right to armorial ensigns. Thus, on the rector's lodgings at Lincoln college, Oxford, erected in the 15th c., to which Thomas Beckyngton, bishop of Bath and Wells, liberally contributed, is carved the rebus of that prelate—a beacon and tun, with *T*, the initial letter of his Christian name. In Westminster abbey, abbot Islip's chapel gives two forms of his rebus—one, a human eye, and a small branch or slip of a tree; the other, a man in the act of falling from a tree, and exclaiming, "I slip!" Many of the monograms of the artists of the middle ages and early printers were rebuses. That of Ludger von Ring was the letter *L* inserted into a ring. A large proportion of the early coats of arms were rebuses on the names of the bearer of them, as for example, three salmons for the name of Salmon, a lock and heart for that of Lockhart, three skenes or dirks for Skene. Family badges are also frequently of the nature of a rebus, and mottoes, as *Ver non semper viret* of the Vernons.

RÉCAMIER, JEANNE FRANÇOISE JULIE ADELAIDE BERNARD, DAME, perhaps the finest representative specimen, in later times, of that character peculiarly French, the "woman of society," the potentate in petticoats, who sways the *salon*, and out of it becomes in doing so a sort of "unacknowledged legislator"—was born at Lyons in Dec., 1777. Her father was a banker of that city, and, as well as her mother, was distinguished by much of the personal grace and charm which, in the daughter, seem to have culminated, as it were, in a form of almost typical perfection. She was beautiful, and in rare measure possessed, as the soul of her beauty, the woman's indefinable fascination, the *je ne sais quoi* of her country. She was educated under the charge of an aunt in the convent of La Déserte; and at about the age of 15, she went to Paris to join her parents, who had some time before migrated thither. Shortly after, she was married to M. Jacques Récamier, a rich banker about thrice her own age. The union is said to have been scarcely in the ordinary sense connubial ("*M. Récamier n'eut jamais que des rapports paternels avec sa femme*") but a mutual affection and respect informed it from the first, and consecrated it to the end, as passion might possibly have failed to do. A record of the splendid social triumphs of Mme. Récamier would involve notice of nearly all that was distinguished in Paris during a space of about fifty years. In that strange, impalpable, yet most real way, of which, in this country, we can have only a faint and also coarse conception, she became a power, and she continued so; and this despite changes of fortune, which, among *us*, would have involved the extinction of even a more solid celebrity. To the famous Mme. de Staël she was bound by ties of extreme affection and intimacy; and when her friend was banished from Paris, as having drawn on her the little jealousy of Napoleon, she lavished her sympathy on the brilliant exile. Sometime after, the complete ruin of her husband's fortunes induced her to accept an invitation from Mme. de Staël to join her at Coppert in Switzerland (1806). Here she was thrown into the society of prince August of Prussia, and a mutual attachment ensued. It is supposed that, of all her innumerable admirers, he alone succeeded in touching her heart. A marriage was arranged, the necessary condition of which was the consent of M. Récamier to a divorce. This was not refused; but his mild and touching remonstrance sufficed to divert from her purpose a woman, on the one hand, of generous and noble feeling, and probably, on the other, constitutionally incapable of any very vehement passion. The man whose brilliant prosperities she had shared, she shrunk from deserting in the decay of fortune which had by this time befallen him. The devotion of her princely lover continued till his death in 1845; but it does not appear that after his first distinct failure—though he frequently again met his beloved—his efforts to secure her were very vigorously renewed. The lady's genius for love does not seem to have been great; but for friendship, it was almost unexampled. The most distinguished *ami* of her later years was M. de Chateaubriand, who solaced himself in his peevish decline by an almost daily visit to her. In 1846 he became a widower, and he then wished to marry Mme. Récamier, a widow since 1830; but the lady declined the honor—wisely for herself and for M. de Chateaubriand. Till the last day of Chateaubriand's life, he found—though his hand had been refused by her—in the friendship of Mme. Récamier almost his only source of cheer and satisfaction. Chateaubriand died July 4, 1848, and Mme. Récamier followed him on May 11, 1849. She died not so much of grief as of cholera, a disease of which her dread had always been great; and dying, she left behind her a reputation which must continue to give her a historic place among the French queens of society. If not quite so brilliant as some of them, she was obviously much more correct than most, on a ground of virtue or of coldness. Specially brilliant she was not; but she seems to have moved in some atmosphere breathed about her of bewildering charm and fascination. Passion, in its fiercer sense, she had not in herself, nor does she seem much to have inspired it; but the genius of refined *philander-*

ing, as it is termed, was probably never more exquisitely embodied. See *Souvenirs et Correspondance tirés des Papiers de Mme. Récamier* (Par. 1859).

RECANA'TI, a t. of central Italy, in the province of Macerata, on the Musone, 14 m. s. from Ancona. It is a station on the railway between Ancona and Rome. Recanati was a powerful military position in the 11th c.; great privileges were bestowed on it by the emperor Frederick II. in 1229, when the whole line of coast from the Potenza to the Musone was granted to it for the erection of a port. Pop. above 6,000.

RECEIPT is the technical as well as popular term signifying a legal acknowledgment of money received in discharge of a debt or demand. It is often popularly believed that a written receipt is the only legal proof of payment; but this is a mistake, the fact being that it is only one mode of proving it. If the money be paid in presence of witnesses, or even without witnesses, provided a jury or judge believe the statement on oath of the party paying it, this is, in England, quite as good evidence of the payment as if a written receipt were given; and even a written receipt is not conclusive, for it is subject to explanation, and if it was obtained in advance of a payment which never followed, or by fraud, it goes for nothing as a discharge of the debtor. If a receipt is in writing, and the sum paid exceeds 40s., it must be stamped with a penny receipt-stamp (which may be an adhesive stamp), otherwise the receipt is inadmissible as evidence of payment. Not only is a receipt proper subject to stamp-duty, but also any note or memorandum given to a person on payment of money, and acknowledging payment of any part of a debt or demand, whether signed or not; so receipts given on payment of bills of exchange or promissory-notes, are liable to stamp-duty. But there are several exceptions from liability to stamp-duty. Such are receipts for deposits with bankers (except when paid on allotment of shares, or in respect of calls on shares); receipts as to the assessed taxes—for land-tax, income-tax, and payments to the crown; receipts by officers, seamen, marines, or soldiers for wages or pay; receipts for purchase of government stock; receipts written on the back of duly stamped bills of exchange or promissory-notes, or upon the back of duly stamped purchase-deeds. Where a debtor tenders money, but requires a stamped receipt at the same time, he ought to provide himself with paper, and stamp, and writing materials, for the creditor is not bound to supply these. In Scotland, the receipt of money cannot be proved by witnesses, where the debt was created by writing, and it is not allowed to dispute the validity of a written receipt, except in cases of fraud.

RECEIVERS, officers appointed by the court to receive and hold money for the use of others and to render an account of the same, or in equity proceedings to receive the rents or profits of land or the profits of other property the ownership of which is in dispute. The receiver acts as the ministerial agent of the court, and must be without any personal interest in the disputed question. The cases in which the appointment of such an agent is most common are such as the winding up of business corporations, insurance companies, and banks, and in the dissolution of partnerships by suit brought by one partner against his copartners. Where judgment has been rendered against a debtor but cannot be satisfied by levy and execution, on application of the creditors a receiver may be appointed to collect assets payable to the debtor and apply them on the judgment. It is by statute provided in most states that receivers may be appointed in certain cases, and especially in winding up the affairs of a bankrupt or insolvent corporation, and the duties and responsibilities of the position are carefully defined. After the appointment the owner can exercise no rights of ownership over the property. The receiver may bring suits, but only after obtaining authority for each case from the court, and he is secured from all suits brought against him without permission from the same source. An attorney or solicitor will not be appointed by the court. When once appointed the receiver has a vested legal right in the property or assets as trustee, and in order to defend the rights of the interested parties may do any act which an owner might do, being accountable only to the court from which he derives his authority. He is liable in damages for loss of value by the negligent or dishonest execution of his trust, but is bound to use only the ordinary care required of a bailee for a consideration. As a rule, receivers will not be appointed where the property is already in the court's possession, or where the applicant has possession under a legal title, or where his equitable title is defective.

RECEIVING STOLEN GOODS is a criminal offense, distinct from larceny. It implies that the goods were received with the knowledge that they were stolen. The offense is felony, and punishable with penal servitude from 8 to 14 years; or 2 years' imprisonment, with or without hard labor. In cases where the stealing is only a misdemeanor, then the receiving is also only a misdemeanor; and where the taking of property is an offense punishable on summary conviction, the receiving with knowledge is punishable in the same way. It is sometimes extremely difficult to distinguish between the case of a receiver and of one who is a party to the stealing, or a principal. The thief may be a witness against the receiver.

RECENT, or HUMAN PERIOD, in geology, is the title given to the epoch that has elapsed since man made his appearance on the globe. The causes that operated throughout the ages of geological time to produce the changes recorded in the various sedimentary deposits, did not terminate with the beginning of human history, but have been ever acting since man was able to observe and to record his observations, and are still in progress around us. The solid earth is being washed away by atmospheric agency, and the abraided portions are continually carried away slowly and imperceptibly by streams and rivers, to form new deposits in the depths of inland lakes or of the ocean. Volcanoes are throwing up lava and scoriæ, and earthquakes are elevating portions of the earth's surface in one place, and depressing them in another; and plants and animals are, either with their living bodies, or their dead exuviæ, forming, as in past ages, deposits in various places, as in the foraminiferous ooze of the deep ocean, and the enormous coral reefs of the eastern seas, or the peat-mosses and diatomaceous earths of temperate climes. The record of all these changes, and the remains of man and of the plants and animals which the strata produced by them contain, have for some years received great attention. As they form common ground for the antiquary and geologist, they have been diligently investigated by the students of both sciences. The classification adopted for the subdivision of the recent period is based on what is supposed to have been the progress of human civilization. The first rude inhabitants of a country seem to have been acquainted only with stone implements. Their hammers, knives, and spears were made of stone, sharpened by chipping the edges, and subsequently by grinding and polishing. In Denmark, these stone implements are found buried in peat-mosses, associated with the remains of plants and animals that still live in that or neighboring countries. The common tree in these mosses is of Scotch fir, which has not been a native of Denmark during historical times. Of the same age are the "kitchen-middens," found on the coasts of the Danish islands in the Baltic. They are mounds of the shells of the oyster, cockle, periwinkle, and other edible mollusca, like those formed by the North American Indians on the eastern shores of the United States. The implements found in them are formed of stone, sometimes of wood and bone, but never of metal. Similar "middens" have been described as occurring in various places in the n. of Scotland. The people who built the earliest of the lacustrine habitations of Switzerland were also unacquainted with the use of metals. See CRANNOGES. The paucity or almost absence of human bones in such early deposits, whether in Denmark or Switzerland, is attributed by antiquaries to the supposed practice of burning the dead.

While the lower portion of the Danish peat-mosses is characterized by the presence of stone implements and the trunks of Scotch fir, the upper portions of the same mosses abound in trunks and acorns of the common oak, and with these are associated implements and articles of bronze. In many of the Swiss pile buildings, the bronze implements also supplanted those of stone. The various articles exhibit a considerable advance in civilization, as is to be expected from the using a metal, the possession of which implies the existence of foreign commerce, since tin was in ancient times only obtained from Cornwall.

In progress of time, the oak in its turn disappeared from the surface of Denmark, and was followed by the beech, which still continues to flourish luxuriantly in Denmark. The use of bronze also gradually gave way before the now discovered iron. A few of the lake buildings seem not to have been abandoned until after the inhabitants became acquainted with the use of iron, as some articles made of this metal have been found at Nidau.

While it is useful thus to characterize the various steps in the civilization of man, and to associate them with the strata in which they occur, it would be a source of endless error to suppose that all such strata are contemporaneous; for the various ages have really existed at the same time not only in different countries of the world, but even in contiguous regions, and probably implements of the three materials have been used at the same time by different inhabitants of the same district. See BRONZE, AGE OF. The occurrence, then, of stone implements in several deposits exhibits not a similarity of age, but a similar stage of advancement in civilization, consequently no dependence can be placed on those calculations which trace back the iron, bronze, and stone periods as if they had preceded each other in regular chronological series, and each had occupied a given number of years.

RECEPTACLE, in botany, the expanded and abbreviated termination of a floral axis, bearing many flowers close together, as in the *heads of flowers* of the *compositæ* and in the fig. The receptacle assumes a great variety of forms, and sometimes, as in the fig, becomes a chief part of the fruit. It is the eatable part of the artichoke, and the "cheese" of thistles, so well known to school-boys. The name receptacle is sometimes also given to that part of a single flower from which the whorls of floral envelopes and parts of fructification, or some of them, spring; which, however, is more properly called the *thalamus* or *torus*.

RECEPTION, RELIGIOUS, of monks, nuns, and other religious persons, is the ceremonial whereby they are admitted to the probationary state called the novitiate (q.v.). Before the ceremony of reception, a short preparatory stage must be passed through by the candidate (called at this stage a "postulant"), the duration of which usually ranges from two to six months. The ceremony of the reception, called also "clothing," is performed by a bishop, or a priest delegated by a bishop, and consists in blessing the religious dress or habit, and investing the postulant therein with appropriate prayers, the hair being at the same time cut off, and the secular dress laid aside, in token of the renunciation of the world and its pomps and pleasures. The reception, however, is understood to be only a provisional step; and the novice remains free to return to secular life at any time during the novitiate.

RECHABITES. In I. Chron. ii. 55, the house of Rechab is identified with the Kenites who came into Canaan with the Israelites; one branch of them settling in the n. part, and another in the territory of Judah. From the book of Jeremiah it appears that they remained in the land until the Babylonian captivity, and during several generations obeyed the command of Jehonadab, their founder, not to drink wine, sow seed, plant or own a vineyard, or build houses, but to dwell in tents forever, that they might live many days in the land where they were strangers. When forced to seek shelter from the Chaldeans within the walls of Jerusalem, they still refused to violate these injunctions of their ancestors. Their example was placed by the Lord in strong contrast with the transgressions of his own commandments by the Jews. "The sons of Jonadab have performed the commandment of their father which he commanded them; but this people hath not hearkened unto me." "Jonadab the son of Rechab shall not want a man to stand before me forever." There are implications that they were admitted among the Levites. After the captivity one of the tribe was ruler of a part of Jerusalem; and rebuilt one of its gates. In I. Chron. ii. 55, they are mentioned among the scribes who were chiefly, if not exclusively, Levites. Hegesippus, in a passage quoted by Eusebius, says that, while the scribes and Pharisees were stoning James the just, one of the priests of the sons of Rechab, who are mentioned by Jeremiah the prophet, cried out, probably against the crime. Benjamin of Tudela, in the 12th c., in the record of his travels, says that near El Jubar he found Jews 100,000 in number who were named Rechabites. They tilled the ground, kept flocks and herds, and abstained from wine and flesh. Dr. Wolff, a traveler of the present century, says he found 60,000 bearing the same name: and a later traveler still, about 1860, met a tribe that called themselves by the same name.

RECI'FE. See PERNAMBUCO, *ante.*

RECIPROCAL (Lat. *reciprocare*), a term which is employed in mathematics in a sense analogous to that attached to it in ordinary language. A geometrical proposition is the reciprocal (or *inverse*) of another, when the "data" of the one are the "quæsita" of the other, and *vice versâ.* In algebra, one quantity is the reciprocal of another when the one is the result of unity divided by the other; thus, 2 and $\frac{1}{2}$, x and $\frac{1}{x}$, $\frac{a}{b}$ and $\left(1 \div \frac{a}{b}\right)$ or $\frac{b}{a}$, are reciprocal quantities. The product of a quantity by its reciprocal must always be unity. *Reciprocal or inverse proportion*, a term formerly much used in arithmetical treatises, but now, and with much propriety, generally disused, referred to such questions as the following: If a rectangular field be 800 yards long and 240 broad, what must be the breadth of another rectangular field of equal area which is 960 yards long?—the answer being 200 yards. In this question we see that the breadths are not proportional to the lengths, but to the reciprocals of the lengths; thus, $\frac{1}{800} : \frac{1}{960} :: 240 : 200$; but in all such problems, it is better for the pupil to be left to exercise his judgment in applying to them the ordinary rule of proportion.

RECITATIVE (Ital. *recitativo*, from *recitare*, to recite), a species of vocal composition which differs from an air in having no definite rhythmical arrangement, and no decided or strictly constructed melody, but approaches, in tonal succession and rhythm, to the declamatory accents of language; it is, in fact, as near an approach as possible to speech delivered in musical sounds. Recitatives are not performed in any strict species of time, the length of the notes depending on the singer, who lengthens or shortens them according to the expression required. It is, however, usual to note a recitative in common time, in order to facilitate the reading; and when any part of a recitative is to be performed in strict time, this is indicated by the words *rec. a tempo.* When a recitative is accompanied merely by a few simple chords of an instrument, to indicate to the singer the pitch and the harmony, it is called *recitativo secco* or *parlante*, declaimed recitative. When the voice is accompanied by a considerable portion of the instruments of the orchestra, either in sustained chords or florid passages, it is termed *recitativo accompagnato, strumentato*, or *obbligato.* Recitative was largely used in the ancient drama; and is used in the opera to express some action or passion, to relate a story, reveal a secret or design, etc. It is said to have been first introduced in the opera by Emilio del Cavaliere at Rome.

RECLAIMING, in the law of Scotland, means the appeal from a judgment of the lord ordinary to the inner house. The reclaiming days are ten days after judgment, except against interlocutors disposing in whole or in part of the merits of the cause. The step by which the appeal is commenced is a reclaiming note.

RECLUS, JEAN JACQUES ELISÉE, b. 1830 in the Gironde; son of a Protestant pastor, and early noted for his devotion to republican principles. After the *coup d'état* of Louis Napoleon in 1851, forced to leave France, he traveled in Great Britain, the United States, and South America, and remained for several years in New Granada. Returned to France in 1857, he became editor of the *Revue des Deux Mondes* and of the *Tour du Monde*, etc. On the breaking out of the war of secession in the United States, his articles were of conspicuous value in giving a clear view of the nature of the struggle, and directing public sympathy to the administration of Lincoln; for which the American minister in Paris thanked him. He aided in the production of the *Guides Joanne*, remarkable for their accuracy of information and charm of style; and is conspicuous for his popularization of scientific studies for youth. His repugnance to the Napoleonic reign induced him to join the internationals in 1869. During the siege of Paris in 1871 he served as common soldier; was author of the *Cri du Peuple* published in March of that year; a soldier of the commune, in the balloon service, taken prisoner by the troops of the government, and banished from France. Charles Darwin and other distinguished scientists united in a petition to the French government for his recall, on the ground of the services which he had rendered to science and popular education, and the value of his continuance of similar service; but Reclus, who had established himself in Switzerland, refused to return except under a general amnesty to all the members of the commune government. He was made a member of the central committee of the geographical society of Paris in 1869. Among his numerous works, *La Terre*, in 2 vols., beautifully illustrated, published 1867–68, is the most elaborate, though his books of travel were the basis of his reputation.

RECLUSE' (Lat. *reclusus*, also *inclusus*, shut up), a class of monks or nuns who, from a motive of special penance, or with a view to the more strict observance of Christian perfection, remained shut up from all converse, even with members of their own order, in a cell or other place of strict retirement. This practice was not allowed, except to persons of tried virtue, and by special permission of the abbot; and the recluse was, with due solemnity, locked up in the presence of the abbot or the bishop, who placed his seal upon the door, not to be removed without the authority of the bishop himself. The celebrated mediæval theologian, Rabanus Maurus, was a recluse, when elected archbishop of Mentz. Nuns also were found to practice the same voluntary seclusion, especially in the Benedictine, Franciscan, and Cistercian orders. A rule, specially designed for female recluses, was composed by Ælred of Reresby, and is preserved by Holstenius in his *Codex Regularum Monasticarum*, vol. i. p. 418, and following.—In a wider sense, the name recluse is popularly applied to all cloistered persons, whether men or women, even those who live in community with their brethren.

RECOG'NIZANCE is a kind of judicial bond entered into with a court of record, the object of which is to secure the doing of some act, as the appearance of witnesses at a criminal trial, or the keeping of the peace by one who has threatened or assaulted another. The form of it is thus: "A B doth acknowledge to owe to our lady the queen the sum of ten pounds," or some other sum to be levied of his goods if he fail in the condition endorsed; and then a condition is added, which states that if the thing secured is done, then the recognizance is to be void. This is the mode by which justices of the peace secure the attendance of the prosecutor and witnesses at the trial of a prisoner who has been committed for trial, or the future good behavior of one who has committed a breach of the peace. If the thing secured is not performed, then the party bound forfeits his recognizance, that is, a debt of the amount specified becomes forthwith due to the crown.

RECOGNIZANCE (*ante*), in law, is defined by Blackstone as "an obligation of record, entered into before a court or officer duly authorized for that purpose, with a condition to do some act required by law which is therein specified." In criminal cases it is taken by the judges of the different criminal courts, by justices of the peace, or in some cases by the sheriff; but in capital crimes, as a rule, by the court of highest jurisdiction. In civil cases it is taken by the court, or by magistrates duly authorized by statute. It is a memorandum made on the record by the court or other authority. It does not require the signature of the party who is to appear. Loss of custody by the government without fault of the bail, or surrender of the defendant at any time before a certain period after the sheriff has returned *non est*, a discharge of the principal under bankruptcy or insolvency, etc., discharge the bail. The remedy on a recognizance is by *scire facias* against the bail. See BAIL.

RECOIL'. When the charge of gunpowder contained in a gun is fired, the sudden expansion of the powder into many times its former bulk acts with equal force in every direction. The resistance offered by the ball, which moves more or less easily in the bore, being far less than that of the bulky and heavier gun and carriage, the ball is forced to a great distance; but the gun, with its carriage, must nevertheless feel the reaction, and is driven backward a certain space, ordinarily a few feet. This retrograde motion is called the recoil, and dangerous accidents sometimes take place from it. After the recoil, the gunners have to work the piece back to its former position for the next discharge. In the Armstrong naval gun, and some other modern cannon, the trunnions of the gun are mounted on an inclined plane, up which the recoil drives them, to run down again by their own weight. See also the description of the Moncrieff GUN-CARRIAGE. Other expedients have been tried with greater or less success; among them may be cited a series of solid India-rubber buffers, which, being compressed by the recoil, drove the gun home again on recovering their shape. The gun and shot remaining the same, the recoil is proportionate to the charge.

The recoil of small-arms is known as their "kick," and is felt on the shoulder of the marksman.

RE'COLLET (Lat. *recollectus*, gathered together), a name given to the members of certain reformed bodies of monastic orders, whether of men or women, in the Catholic church. Among orders of men, an offshoot of the Augustinian hermits, which, under Louis de Montaya, in 1530, obtained considerable popularity in Spain, was called by this name, and the order still exists at Medina Sidonia, Leon, and Pamplona; but outside of Spain this order is better known under the title of the REFORMED FRANCISCANS, who were established in France under Henry IV. and Louis XIV., and spread thence into Belgium, their houses in these countries and Germany becoming so numerous that they reckoned no less than ten provinces. A reform of the Cistercian order of nuns in Spain was called by the same name.

RECON'NAISSANCE, RECONNOI'TER, the noun and verb expressive of the operation of inspecting a country in which military operations are intended. This duty devolves on the department of the quarter-master general, and requires the exercise of qualities of a very high order. The officer deputed to reconnoiter is well mounted, and accompanied by a small escort, also well mounted, in order to escape if noticed by the enemy. His duty is to measure every natural feature in his district by eye, or by more accurate measurement when practicable, and to produce a map, showing hills, valleys, streams, canals, plains, woods, etc. He must at the same time note all obstacles; what resources the country possesses to maintain men or horses; what the disposition of the inhabitants, etc. Reconnoitering is necessarily a very dangerous service; an officer so employed has often to resort to disguises, and if taken, runs some risk of being treated as a spy.—A maritime reconnaissance is analogous.

RECORD, as a legal term, is used in the United Kingdom to signify the formal statements or pleadings of parties in a litigation. In general, the rule is well settled that the pleadings which make up the record do not enter into details of the evidence, but merely set forth the conclusions or inferences, leaving the details of evidence to be supplied at the trial before a jury, or, if there is no jury, at the hearing before the judge or court. All the higher courts file the records in the suits, and are called courts of record, and one of the incidents of a court of record is that the court or judge can commit for contempt any person who insults the court, or willfully obstructs the business. A trial by record means that one of the parties has set up some former decision of the court, while the other denies that such a decision ever existed; whereupon the only mode of solving the question is by producing the record of the former action, and so settling the dispute. In the courts of common law of England, the parties, by the rules of pleading, come to an issue at last, after mutually answering each other, and the issue is either some short point of fact or of law. No intervention of the judge or court is necessary to come to an issue. In Scotland, however, the closing of the record is a formal step which requires the sanction of the judge, who closes the record after each party has said all he wishes to say by way of statement and answer. See also REGISTRATION.

RECORD OF CONVEYANCES, by public officers and for the public to examine at will, is universal in the United States, but unusual, incomplete, and imperfect in England. The statutes of each state provide for the appointment of an officer, sometimes called the register of deeds, whose duty it is to receive and record all warranty and quitclaim deeds, mortgages, and assignment of the same and leases for a term beyond a specified limit, which may be presented in properly authenticated form. The duties of this office are very often made part of the county clerk's functions. The recording officer must certify that the conveyance has been presented and recorded at the specified date. Conveyances made after the first is recorded are void, and any conveyance not recorded is void as against a subsequent *bona fide* purchaser from the person in whose favor a recorded conveyance has been executed. But between the parties to the conveyance the recording or non-recording is of no moment. As a rule also the rights which have accrued to any party before the registry cannot be affected by such recording. But how far the recording is to be regarded as a constructive notice and to whom it acts as notice, are matters governed entirely by the state statutes. It is usual to allow a properly recorded deed to be introduced in evidence without further proof of its execution, and in some states the record itself is admitted as evidence. It is generally held that actual notice received by a second purchaser or mortgagee destroys all priority of claim which would otherwise arise from his being the first to record his conveyance. Differing views are held by the courts as to what circumstances will constitute a good notice.

RECORDE, ROBERT, generally allowed to have been the greatest English mathematician of the 16th c., but now almost forgotten, was b. about 1500 at Tenby, in Pembrokeshire, Wales. He completed his education at Oxford, and there distinguished himself in mathematics, rhetoric, music, and anatomy; but wishing to make medicine his profession, he removed to Cambridge, and there, in 1545, he received the degree of M.D., "being much admired by all who knew him for his profound and varied knowledge of art and science." In 1547 he was in London, engaged in the composition of the *Urinal of Physic* (1548), a work which saw five editions; and was about the same time appointed family physician to Edward VI., and afterward to queen Mary. Ten years after this we find him in the debtors' prison in London, where he died miserably in 1558. His works are all in the form of dialogues between a master and his pupil, and are written in the rude English of his time; they are—*The Gate of Knowledge*, and *The Treasure of Knowledge*, two works which seem to be completely lost; *The Ground of Arts, teaching the Perfect Work and Practice of Arithmetic*, etc. (Lond. 1549), an arithmetical work which has been frequently reprinted, and which exhibits a curious "melange" of the Arabic and Roman notation; *The Pathway to Knowledge* (Lond. 1551), an abridgment of Euclid's *Elements; The Castle of Knowledge, containing the Explication of the Sphere both Celestial and Material*, etc. (Lond. 1551), an astronomical work, dedicated to queen Mary, in which he compares the Ptolemaic and Copernican systems, and, but with great hesitation, gives the preference to the latter; *The Whetstone of Wit, which is the second part of Arithmetic*, a treatise upon algebra, a subject at that time little known, in which Recorde collects the substance of the best continental writers, and adds his own improvements and discoveries. In the appreciation of the general results derivable from algebraic formulæ, he is far beyond his contemporaries, with the sole exception of Vieta (q.v.). Recorde is regarded as the inventor of the symbol (=) for equality, and of the mode of extracting the square root of compound quantities. Recorde's talents seem to have been as varied as profound, for, besides his mathematical pre-eminence, he was considered to be a skillful doctor, an able lawyer, and a philologist of mean ability.

RECORDER is a judge of a city or borough court of quarter sessions, being a barrister of not less than five years' standing. He is appointed by the home secretary, and the salary is paid by the city or borough out of the borough fund. His duties are the same as what are usually discharged by courts of quarter sessions, and are confined chiefly to the trial of prisoners who have been committed by justices of the peace for trial during each quarter of a year. The recorder is not prohibited from practising at the bar, and he is almost invariably a counsel in active practice. The salary is generally small, but, nevertheless, the office is in great request among members of the English bar. There is no such office in Scotland, but the sheriff discharges similar duties.

RECORDER, the name of a musical instrument formerly in use in this country, somewhat like a flageolet, but with the lower part wider than the upper, and a mouth-piece resembling the beak of a bird. Its pitch was an octave higher than the flute, and it had a pleasing tone, hence Milton speaks of

The Dorian mood
Of flutes and soft recorders.

RECORDS, PUBLIC (Lat. *recordari*, to remember), contemporary authenticated statements of the proceedings of the legislature, and the judgments of those higher courts of law which are distinguished as courts of record. It has been a subject of much discussion what constitutes a record, and in a looser sense the term record has sometimes been applied to any public document preserved in a recognized repository. No country is so rich in public records as England. A committee of the house of commons, in 1837, described the public records of England as comprised under four classes. 1. Independent series of records of territorial surveys at different periods. 2. Series of enrollments, comprising on one roll varieties of distinct entries, classed together according to their formal character. 3. Records of judicial proceedings. 4. Separate documents, as letters, inquisitions, commissions, and privy seals. Act 1 and 2 Vict. c. 94 sets at rest the question what is legally to be held a record, by providing that the word records shall be taken to mean all rolls, records, writs, books, proceedings, decrees, bills, warrants, accounts, papers, and documents, whatsoever belonging to her majesty, or then deposited, or which ought to be deposited, in any of certain places of custody, which are enumerated.

The oldest existing English records are tallies in exchequer, which down to 1834 continued to be used both for receipts and for simple records of matters of account. They consist of wooden rods, marked on one side with notches, to indicate the sum for which the tally was an acknowledgment; while on the two other sides were written the amount, the name of the payer, and the date of the transaction; and the tally being divided longitudinally, the one half was preserved in exchequer, and the other given to the person who had paid the money. This rude contrivance, which came down to us from Anglo-Saxon times, was an effectual safeguard against forgery. Parchment is the material on which the greater portion of the records are written; the skins being, in some cases, as in the rolls of the exchequer and common law courts, attached at the top bookways; in other cases, as the chancery and wardrobe, sewed consecutively. Some records are in the form of books, as *Domesday;* others are filed—i.e., each document is pierced with a string or gut passed through it, the whole being fastened together in bundles. A few records are written on paper. The early parliamentary records and statutes are principally in Norman-French, which continued in partial use till the time of Henry V.; all the other great series of records, except those of parliament, are in Latin down to the reign of George II., or later, except during the commonwealth, when English was substituted.

Public records, which can be traced in germ before the conquest, gradually expanded under the Norman and Plantagenet kings. They enabled the subject to defend and maintain those feudal rights and privileges which were gradually trenching on royal prerogative, and to protect himself from arbitrary exactions; while to the king they furnished precedents which could not be questioned for his calls of military service and taxation.

The various courts being the king's courts, and following the sovereign from place to place, their earliest receptacles were the royal palaces in different parts of England; but when the higher courts were permanently established at Westminster, "treasuries," or places of custody for the records of the different courts, were appointed there. A portion of the public records were, as far back as Henry III.'s reign, deposited in the tower of London and New Temple; and in the reign of Edward III. the tower had become a permanent treasury. The parliamentary committee of 1837 enumerated among the places of deposit a room in the tower over a gunpowder magazine, and contiguous to a steam-engine in daily operation; a chapel at the Rolls, where divine services was performed; underground vaults at Somerset house; damp and dark cellars at Westminster hall; the stables of the late Carlton Ride; and the Chapter-house, Westminster. From the reign of Edward II. downward, the attention of parliament had often been called to the safe custody and arrangement of the records as an object of solicitude. The fullest examination in recent times was made by a committee of the house of commons in 1800, whose report presents far the most comprehensive account of the records in existence. A commission was appointed to go on with the work which the committee had begun, and renewed six times between 1800 and 1831. All the several record commissions directed the commissioners to cause the records to be methodized, regulated and digested, bound and secured, and to have calendars made, and original papers printed; and numerous valuable publications have been issued by the commissioners from time to time. A full investigation into the proceedings of the record commissioners was made by a committee of the house of commons in 1835, since which time annual reports have been issued by the deputy-keeper of records. The most important recent statute regarding the custody and preservation of the records is 1 and 2 Vict. c. 49, which restores to the master of the rolls that custody of the records which he had originally possessed, but which had for a long time become nominal. That officer is empowered to appoint a deputy-keeper of the records, and in conjunction with the treasury, to do all that is requisite in the execution of this service. He makes rules for the management of the office, and fixes what fees may be demanded. He allows copies to be made, which, when certified by the deputy and assistant keepers, and authenticated with the seal of the office, are producible as evidence in courts of law. The home secretary directs from time to time such of the catalogues, calendars, and indexes, and such of the records as he thinks fit, to be printed, and sold at prices fixed by him. The act 1 and 2 Vict. c. 94 contemplates the consolidation of all the records in the large receptacle near Fetter lane, into which, under sir John Romilly, then master of the rolls, they began to be gradually collected from their different scattered depositories.

Our limits will not allow us to enumerate more than a very few even of the more important classes of records. One class consists of the various territorial surveys, beginning with *Domesday* (q.v.), and including, among others, the *Rotuli Hundredorum*, *Extenta Manerii*, *Testa de Nevill*, *Pope Nicholas's Taxation*, *Henry VIII.'s Survey*, and the *Survey of the Commonwealth*. Another extensive class belong to the *Exchequer*, including the *Pipe Roll*, or great roll of the exchequer, beginning with the second year of Henry II., containing the yearly accounts of the revenues of the crown, certain and casual; the *Memoranda* and *Originalia* rolls, records of *First-fruits and Tenths*, records of the *Court of Augmentations*, instituted to decide questions regarding possessions belonging to the crown, on the dissolution of the monasteries, and *Placita*, or records of pleadings and judgments. The *Rotuli Curiæ Regis* contain the record of the proceedings in the ancient supreme court of law; and there are numerous classes of records of the proceedings in all the various courts of common law and in the court of chancery. The record of *Fines and Recoveries* is an unbroken record of the transfer of lands from 25 Henry II. down to 1833, when this species of conveyance was abolished. The *Charter Rolls* are records of charters, of grants of privileges to religious houses, towns, and corporations, and creations of nobility from 11 Edward II. to Edward IV. The *Patent Rolls* are enrollments of instruments written on open (*patentes*) sheets of parchment, having pendent from them the great seal, addressed to the lieges in general. The *Close Rolls* are records of such letters under the great seal as were dispatched closed or sealed up—royal mandates to particular persons for particular purposes, and not intended for public inspection. The *Liberate Rolls* contain writs issued out of chancery, ordering the payment of money from the treasury. The *Fine Rolls* contain accounts of fines paid to the king for license to alienate lands, freedom from knight-service, passing or renewal of charters, wardships, safe-conduct, pardons, etc. The *French Rolls*, *Norman Rolls*, and *Gascon Rolls* relate to the affairs of France, Normandy, and Gascony, when held by the English; and the *Rotuli Scotiæ* to transactions with Scotland. An important class of the records are those connected with parliament, including *Statute Rolls*, *Parliament Rolls*, *Records of Parliament*, and *Statutes* from 1485 to the present time, with the *Journals of the Lords and Commons* from Henry VIII. to the present time, and the *Writs of Summonses* and returns to parliament.

The *state papers* originally sprung from the privy council and chancery, and include the correspondence of the privy council, secretaries of state, and other public departments, with miscellaneous domestic papers from the time of Henry VIII. to George II., a mass of correspondence with foreign powers, and an extensive collection relating to ecclesiastical affairs at and after the reformation. Since 1855 the state paper office has become a part of the public record office, and been placed under the control of the master of the rolls. Much has been done in the way of calendaring and arranging the contents of this valuable repository, and several volumes of calendars of state papers are being issued yearly to the public.

By the regulations established by the master of the rolls, July 5, 1858, persons desirous of consulting the public records, including state papers, for a literary purpose, have to apply in writing to the deputy-keeper, stating the objects of their search, which, if necessary, may be more fully explained at a personal interview. If the explanation be satisfactory, a permission is issued to inspect and make extracts without payment of fees.

Scotland.—The public records of Scotland were undoubtedly numerous and multifarious as early as 1282; but the more ancient of them were lost by shipwreck in the reign of Edward I. of England. The control of the records has from very early times been intrusted to the clerk register, or lord clerk register, one of the high officers of state, who had a seat in the Scottish parliament, to whom, and his deputies and other officers appointed by him, it was assigned to superintend both their formation and their custody. The earliest records of Scotland were in the inconvenient form of rolls, but in the reign of David II. the practice was introduced of writing them in books. By an act of 1463, the king's rolls and registers were appointed to be put in books; but the accounts in the exchequer continued, nevertheless, to be kept in rolls till the passing of another act in 1672, appointing them to be written in books. Prior to the reign of Charles II., the public records were deposited, under care of the clerk register, in the Laigh parliament house, now part of the advocates' library; and shortly before the union, the whole records were transferred to that depository, where they continued till the erection of the large building called the general register house, which was completed in 1787, and has recently been added to. The register house serves the purpose of preserving and making available the national muniments, as well as accommodating the whole offices of record connected with the supreme court. The lord clerk register and his depute have now merely the *custody* of the records, their preparation being intrusted to another class of officers.

Under the Scottish records are included the acts of parliament and of privy council, and the records of all the various courts of justice; also the records of the great seal, privy seal, and signet. An important class of records are the *Retours of Services.* A service is by the law of Scotland necessary to transmit a right to real property to the heir from his ancestor. At present, this service consists of the decision of the sheriff of the county or the sheriff of chancery; but the form in use till 1847 was by retour, a writing which contained the verdict of a jury returned in answer to a brieve from chancery for finding the heir at the death of his ancestor. The register of retours is not extant further back than 1547.

The registers connected with the transmission of heritable rights are even more important. After several unsuccessful attempts to introduce a system of registration, the great branch of the public records known as the *Register of Sasines* was established by act 1617, c. 16. By the system then introduced, which has since been continued with modifications in detail, all instruments requisite to the transmission of real property must be put on record for publication. Besides the principal register in Edinburgh, there are district registers, and any instrument may be recorded either in the general or district register. Volumes are issued from the general register house to the district recorders of sasines, which, when filled, are returned to the general register house. By this means the title to real property can be ascertained with certainty and precision, and may, if necessary, be traced back two centuries and a half. It is also obligatory to record in separate registers all instruments necessary for the constitution, transmission, and extinction of voluntary incumbrances. See REGISTRATION OF DEEDS AND WRITS. This system, while confirming the credit of the proprietor, also operates in favor of the security of creditors. There is a special *Register of Entails,* in which, in terms of act 1685, c. 22, deeds of entail must be recorded at the sight of the court of session. The object of registration in all these cases is *publication;* but charters by subjects, dispositions, bonds, contracts, and other probative writs may, under act 1698, c. 4, be recorded in the *Register of Deeds* for *preservation.* A third object of registration is *execution.* Every deed constituting a personal claim of debt, or an obligation to perform some lawful prestation, if intended to be made the subject of personal dilligence for payment or performance, and must be registered previously to execution being issued on it. Some volumes of calendars of state papers relating to Scotland have been issued to the public.

Ireland.—Many of the records perished during the wars prior to the final reduction of Ireland, and those which survived these commotions were long exposed to mutilation and destruction from the unsatisfactory arrangements for their custody. A commission was appointed in 1810 for the preservation and arrangement of the Irish records, whose labors, conducted with considerable success, were terminated by the revocation of the commission in 1830. In 1847 commissioners were again appointed to investigate the state of the records, in consequence of whose labors a bill for their safe custody was prepared, but afterward abandoned. There is no general place of custody for the records of Ireland, which are scattered in different repositories in Dublin. Several volumes of calendars from the Irish *patent* and *close* rolls have been published under the direction of the master of the rolls.

RECOUPMENT, the right of a defendant to demand damages in the same action of the plaintiff, because the latter has violated some legal duty in the case, or has not fulfilled some cross-obligation of the contract. Formerly it denoted a diminution of the plaintiff's claim on account of partial or entire payment; whereas in modern use it signifies a reduction of damages. For the purpose of reducing the damages, the defendant may show any violation of the contract by the plaintiff which tends to make the consideration less valuable. The defendant must, however, bring an independent action for immediate or indirect damages other than as above specified. The damages recouped may be for a tort; but the tort must be a breach of the contract, and malice will not be taken into account in estimating the damages. The defendant cannot have judgment for the excess of the damages recouped over the plaintiff's claim; and he cannot bring suit to recover such excess. Unless there are statutes to the contrary, the defendant may bring an independent suit, or plead his cross-demand in recoupment, as he chooses; and he may plead in recoupment the same damages upon which he has already brought suit. He may, however, be compelled to say upon which remedy he will rely. Under the New York codes and the other codes resembling it, the general issue being abolished, the defendant must plead his defense, whether to the whole claim or simply in reduction of damages. It has been held in New York, Arkansas, and elsewhere, that recoupment does not apply to real estate, and that the defendant, in a suit against him for the purchase money, cannot recoup because his title has partially failed. But it seems that he has such right after eviction. Failure of title is not the same thing as failure of consideration. The consideration of a deed with covenants fails only when the covenantee is damaged on the covenants, and he can recoup after eviction. But it has been held that the vendee may recoup on the covenants where the consideration has failed.

RECOVERY, in English law, was a term much used in reference to estates tail, though it is also a general term denoting the decision of a court in favor of a party claiming lands or goods. A feigned recovery was an imitation of a similar proceeding, and was a device invented to break an English entail. An estate tail was an estate given to A and the heirs of his body, and at first it was enacted by a statute *de donis*, under Edward I., that A could not sell or alienate the estate, so as to prevent the heirs of his body acquiring the benefit of it. But the lawyers invented a sham action and judgment, called a recovery, by which the issue were barred from all rights. The fines and recoveries act abolished that form, and substituted for it a disentailing deed, which, when executed by the tenant in tail, has the same effect.

RECRUITING. Formerly, the task of raising recruits for the army was intrusted to the colonels of regiments, who employed civilian agents and others to persuade young men to join their standards; these agents often resorting to very illegal methods to entrap recruits. Subsequently, the duty was assigned to several recruiting corps, each known by the name of its commanding officer; but under this system, so many irregularities, and such difference of practice arose, that in 1802, for purposes of uniformity, economy, and proper control, it was decided to place the whole recruiting under the immediate direction of the adjt.gen. For this purpose, the country was divided into recruiting districts. At the head of each district was placed an inspecting field-officer, with the duty of superintending all recruiting parties in his district, and of approving the recruits brought. At the district headquarters there was a paymaster, responsible for all the financial concerns, and a medical officer, who examined the recruits in point of health and physical fitness.

Recruiting parties used to consist of old sergeants, who sought by every means to induce young men to enter the army; they frequented fairs, wakes, and country gatherings, endeavoring by beat of drum, smart uniforms, well-fed, personal appearance, and persuasion—not always too truthful—to convince the rustics of the advantages of the queen's service; advantages which really existed, though not always to the extent depicted. The adoption in 1872–73 of the system of regimental localization changed all this. The United Kingdom is divided into 66 sub-districts, at the head of each of which is a col., who commands the brigade depot, and the auxiliary and reserve forces of his sub-district. He also controls the recruiting within his command, primarily, for the regiments composing the brigade; and secondly, for the rest of the army. To preserve uniformity of action, the colonels report on recruiting matters to the inspector-general of recruiting, an official on the staff at the war office. On a would-be recruit presenting himself, the recruiter must ask him if he already belong to the militia; if not, and he appear physically eligible, he is given a shilling, after which, should he abscond, he becomes a deserter. The sergeant must then give the recruit 24 hours for consideration; afterward, but within 96 hours from first enlistment, he must take him before a magistrate, when, if the recruit declare that he voluntarily enlists, the justice reads to him the articles of war relative to desertion, and puts the questions detailed in the attestation. This done, the oath of allegiance is administered, and the man becomes definitely a soldier, receiving his free kit and bounty. The recruit may avow his dissent before the magistrate, when he must be forthwith discharged on returning the shilling, and paying twenty shillings as "smart" for the trouble he has given. False declarations as to age, previous service, health, etc., involve the recruit in various penalties. About 18,000 recruits are raised annually in time of peace for the British army; but a larger number will be necessary, as enlistment for short service with the colors becomes more the rule.

Recruiting for the navy is treated under MANNING THE NAVY.

RECTIFYING is a process applied to alcohol after its distillation, to remove certain mpurities which come over with it from the still. These, in part, consist of essential oils; and in order to effect their removal, caustic potash is added in sufficient proportion to saponify the oil present; water is also contained in the first distillation, and to remove this, and to assist in removing the oily matters, common pearl-ash is added. Technically, the former of these is called *gray salts*, and the latter *white salts;* and about four pounds of each are added to every 700 gallons of spirit, and well agitated, so as to combine with the oil and water. The spirit is then distilled again, and comes over much more pure, the alkaline salts, and the matters which have been combined with them, being left behind in the still. This is usually repeated two or three times, the quantity of the salts being diminished to one-half in the second, and proportionately decreased in the succeeding distillations. The rectifier is not only a purifier of the alcohol produced by the distiller, but he often gives it a distinctive character; by adding flavoring materials to it, he makes it into gin, brandy, etc. Thus, in order to convert the spirit into London gin, juniper berries and coriander seeds are added previous to the last rectification. Œnanthic ether and other things give the flavor of brandy. This part of the operation is very much varied by the taste and skill of the rectifier.

RECTOR (Lat. *rector*, a ruler), the title of several classes of clerical and collegiate officials, some of which are referred to under their respective heads. As regards clerical rectors, the title, in its most ordinary English use, is applied to the clergyman who holds complete and independent charge of a parish. This use, however, is a departure from the canonical signification of the title, which meant rather a clergyman who was appointed to govern a parish where the chief parochial jurisdiction was vested in a religious corporation or in some non-resident dignitary. In certain of the monastic orders, the name rector is given to the heads of convents, as it is also given to the heads of universities, colleges, seminaries, and similar educational corporate institutions.

RECTUM, DISEASES OF. The terminal portion of the intestinal canal, named from its comparatively straight course, the rectum, is the seat of various affections requiring medical or surgical assistance. Some of these affections, as piles, prolapsus ani, and hemorrhage from the rectum, have already been considered. Among the other diseases of the rectum of sufficient importance to claim notice in these pages are—

1. *Stricture of the rectum,* which may be either spasmodic or permanent. *Spasmodic stricture* is comparatively rare. *Permanent stricture* may be either of a simple or malignant nature. *Simple stricture* consists in a thickening and induration of the mucous coat of the rectum, so as to form a ring encroaching on the caliber of the tube. It is situated about two or three inches from the anus, and the contraction is so great and unyielding that it is often difficult to pass a finger through it. The symptoms are constipation and great pain, and a straining in evacuating the feces, which are passed in a narrow, flattened, or worm-like form, which is very significant of the nature of the case. In an advanced stage of the disease, diarrhœa and prolapsus often supervene. However great may be the constipation, strong irritant purgatives must be altogether avoided. Soft and unirritating evacuations must be procured by such medicines as the confection of senna combined with sulphur (see PILES), or injections of castor-oil or of tepid water. The diet should be regulated so as to assist the action of the medicines. Nutritious soups are serviceable, since, at the same time, they support the strength, and leave little matter to be excreted. When much local irritation is present, it may be relieved by the hip-bath and by sedative injections; till it is subdued surgical interference would do more harm than good. A bougie capable of being passed with moderate pressure through the stricture should be inserted in the gut every third or fourth day, and should be allowed to remain for about a quarter of an hour; and its size should be gradually increased. Nothing is gained by the forcible passage of large bougies. The cure is to be effected by pressure so applied as to produce absorption, not by mere mechanical dilatation. *Malignant stricture*—most commonly due to the scirrhous, but sometimes to the epithelial form of cancer—is by no means a very rare affection, and is more common in the female than the male sex. Until ulceration sets in, the symptoms are like those of simple stricture, only exaggerated in degree; but afterward there is a discharge of fetid muco-purulent matter streaked with blood. In this disease, the treatment can be only palliative unless the surgeon resort to the formation of an artificial anus in the loins as a last resource.

2. *Spasm* of the *sphincter ani* muscle is characterized by extreme pain in the region of the anus, especially when an attempt is made to evacuate the bowels. The muscle contracts so firmly that the surgeon cannot easily introduce the finger into the rectum. The spasm may be caused by piles, by fissure of the anus, by ulceration of the rectum, and

sometimes apparently by mere constipation. It is often relieved by the application of the belladonna ointment of the British pharmacopœia.

3. *Neuralgia of the rectum*, known also as *proctalgia*, is a common disorder, and is especially prone to attack children and gouty persons. It is usually relieved by the judicious use of aperient medicines.

4. *Congestion*, sometimes proceeding to *inflammation*, is not uncommon in the rectum. The congestion occasions a sense of weight and fullness in and about the rectum, together with a variety of other symptoms. Amongst the causes of this affection are stone in the bladder, stricture of the urethra, an enlarged prostate gland, the presence of thread-worms, the abuse of irritating purgatives, exposure to cold draughts in the water-closet, etc.; and there can be no doubt that sedentary habits strongly favor the predisposition to this affection. The great object of treatment is to relieve the overloaded vessels of the rectum. The bowels should be freely opened with castor-oil, leeches should be applied to the verge of the anus, and after their removal a warm hip-bath is advisable.

5. *Pruritus podicis*, or *itching of the anus*, is a very common and extremely troublesome affection. Sometimes it depends on the presence of thread-worms or of old piles, while in other cases it is one of the manifestations of the skin-disease known as *prurigo* (q.v.). The treatment must depend upon the exciting cause.

6. *Fissure of the anus* is a small crack which gives intense pain during the passage of the feces, and often persisting for several hours. Free purgatives, and the application of astringent lotions or ointments (as tannin lotion or ointment of galls) should be tried; and if they fail, partial division of the sphincter muscle must be resorted to—an operation easily performed, and certain to give relief.

7. *Fistula in ano* signifies a fistulous or pipe-like track by the side of the *sphincter ani* muscle. It may occur as a *complete fistula*, which has an external opening near the anus, and an internal opening into the bowel; or as a *blind external fistula*, which has no actual opening into the bowel, although it extends to its outer coat; or as a *blind internal fistula*, in which the preceding conditions are reversed. A sketch of the mode of treatment is given in the article FISTULA.

For a detailed description of these diseases of the rectum, and for information on many other less important affections of this part of the body, the reader is referred to Bushe's *Treatise on the Rectum*, and to the more recent works of Mr. Ashton and Mr. Henry Smith on the same subject.

RECU'SANTS, in English law, are persons who refuse or neglect to attend at the worship of the established church on Sundays and other days appointed for the purpose. The offense as a legal one may be held to date from 1 Elizabeth, c. 2; but there were four classes punishable under the statutes against recusancy—simple "recusants;" "recusants convict," who absented themselves after conviction; "popish recusants," who absented themselves because of their being Roman Catholics; and "popish recusants convict," who absented themselves after conviction. It was against the last two classes that the statutes were mainly directed. In addition to the general penalties of recusancy, the popish recusants, for willfully hearing mass, forfeited 100 marks (£66, 13s. 4d.); and for saying mass, 200 marks, or £133, 6s. 8d., in addition (in both cases) to a year's imprisonment. They were disabled, unless they renounced popery, from inheriting, purchasing, or otherwise acquiring lands; and they could not keep or teach schools under pain of perpetual imprisonment. Popish recusants convict could not hold any public office; could not keep arms in their houses; could not appear within ten miles of London under penalty of £100; could not travel above five miles from home without license; could not bring any action at law or equity; could not have baptism, marriage, or burial performed, except by an Anglican minister; all under penalties of forfeiture and imprisonment. Protestant dissenting recusants were relieved from the penalties of recusation by the toleration act of 1 Will. and Mary, c. 18. Catholics were partially relieved in the year 1791, and completely by the emancipation act of 1829.

REDAN' is the simplest work in field-fortification. It consists of two parapets whose faces join in forming a salient angle toward the enemy, like a letter V, in which the apex is to the front. Regarded by itself, the redan is a work of very little strength since there is no flanking fire to protect its faces, and nothing to prevent an enemy from forcing an entrance at the gorge; but redans are useful in many positions, and the rapidity with which they may be constructed, render them favorites with engineers and generals. A row of redans along an exposed front of an army adds much to its strength, the troops behind protecting the gorge, and the redans flanking each other. It forms an excellent defense for a bridge-head, the gorge being covered by the river. Redans figured largely in Wellington's works for defending Lisbon in 1810. The redan of Sebastopol in 1855 was the principal point of the English attack, and the scene of two bloody repulses by the Russians in June and September.

REDBREAST, *Erythaca rubecula*, or *Sylvia rubecula*, a bird of the family *sylviadæ*, familiar to every one in the British islands and throughout most parts of Europe—a universal favorite, from the readiness with which it approaches or enters human habitations, its lively manners, its aspect of pert curiosity, the frequency with which its song is heard in autumn and winter, and the strange mixture of shyness and audacity which its behavior displays. It is generally known throughout Britain by the endearing name of *robin redbreast*, or more briefly *robin*, and has many similar appellations in continental Europe, significant of the kindly regard entertained for it, which is everywhere such that children early begin to distinguish it from all other birds as their peculiar favorite. Its utmost length is about 5¾ in., but it is of a rounder and fuller form than many of the *sylviadæ*, the slenderness of its legs rather strikingly contrasting with the form of the body. The wings are rather short, the fifth quill the longest. The tail is scarcely forked. The bill is rather broad and depressed at the base, narrower and slightly compressed at the point, the upper mandible bent down and notched. The general color is olive-brown, and the reddish-orange breast is a conspicuous characteristic, particularly of the male.—The redbreast is a native not only of Europe, but of the western temperate parts of Asia and of the n. of Africa. In the most northern parts of Europe it does not appear; and in many northern regions it may be regarded as a bird of passage; but, contrary to the ordinary rule as to birds of passage, it never congregates in flocks; it is always seen either solitary or in pairs. The attachment of pairs seems to extend beyond the mere breeding season, and, indeed, throughout their lives, and to be stronger than in most birds. The breeding season is early in spring. The nest is made of moss, dead leaves, and dried grass, lined with hair, often placed a little above the ground in a bush or among ivy on a wall; the eggs 5 to 7 in number, white, spotted with pale reddish-brown; but many are the stories of the curious situations in which the redbreast has built its nest, in close proximity to houses and workshops, regardless of the presence of human beings, and of the noise of hammers and wheels. In winter, the redbreast seeks the neighborhood of human habitations more than in summer, and becomes more bold and familiar. Its food ordinarily consists of worms, insects, and berries; and when it becomes a pensioner at any door or window, which it very readily does, it shows a particular relish for small scraps of meat. Its song is sweet and plaintive, but weak, not much noticed amidst the many voices of summer, but often heard in the quietness of autumn, and even of winter, throughout which it is continued whenever the weather is good.

In America, the name redbreast is often given to the blue bird (q.v.).

RED COLORS. Those used by painters consist of certain chemical compounds, natural or artificial. Thus, the red pigment called Armenian bole, is either the ochreous earth known by that name, imported from Armenia, Tuscany, and other places, or else, as is most frequently the case, it is a composition of whiting, red oxide of iron, and red ocher. Vermilion is a sulphuret of mercury produced either naturally or artificially. Chrome-red is made by boiling carbonate of lead with chromate of potash in excess, until it assumes a red color, after which it is washed in pure water, and dried in the shade. Indian-red is a native product of Persia, being found in the neighborhood of Ormuz. It is imitated by calcining colcothar with red ocher. Light-red is made by calcining yellow ocher, and this can be converted into flesh-color by a due admixture of white. A bright orange-red, sometimes called sandix, is made by calcining white-lead. Minium, or red-lead, is a very distinct red color, requiring but little preparation; it is much used. Red ocher is extensively found in the Mendip hills, and is an oxide of iron; with clay, it forms a brownish-red paint. There are several other red colors, but these are the principal ones employed by painters.

RED CRAG, a deposit of quartzose sand intermixed with rolled and comminuted shells, of a deep ferruginous or ochreous color, which occurs in Suffolk, and belongs to the pleiocene strata (q.v.).

RED-DEER. See Stag.

REDDEN, Laura Catherine Waller. See Searing.

REDDING, Cyrus, 1785–1806; b. Cornwall, England; at an early age adopted journalism as a profession; edited the *Pilot* of London and the *Chronicle* of Plymouth, and for three years conducted *Galignani's Messenger* at Paris, 1815–18. From that time until his death he was editor of several English papers of liberal politics, and contributed to many others. He wrote many books, the best known of which are *Reminiscences of Thomas Campbell* (with whom he had been joined as editor of the *New Monthly Magazine*); *Fifty Years' Recollections* (1858); and *Past Celebrities whom I Have Known* (1865).

REDDITCH, a busy manufacturing t. of Worcestershire, stands on an acclivity 12½ m. s.s.w. of Birmingham, with which it is connected by railway. Needles, pins, fish-hooks, and fishing-tackle are made extensively. Pop. '71, 6,135.

REDDLE, Raddle, or Red-Chalk, an ochery, red-clay iron ore, which is chiefly imported from the continent, where it is found in Hessia, Thuringia, Upper Lusatia, Silesia, and Salzburg. It is found in small quantities in England, in the neighborhood of Rotherham, and at Wastwater, Cumberland. The English differs somewhat in quality from the foreign, and is chiefly used in polishing spectacle glasses. Of that from abroad the finest quality is used for drawing on paper; the inferior sorts are used by carpenters and others for marking with; and the commonest is used for marking sheep. It occurs generally in thin beds in clay-slate.

REDEMPTION, in law, the right of redeeming property which has been pledged to secure a debt. The equity of redemption is the name given to this right, and is commonly used in reference to mortgages of real estate, the mortgagor, after executing a deed of mortgage, having a right at any time to pay off the debt and redeem or get back his property, unless he has been foreclosed by the creditor by a legal proceeding, the object of which is to sell the property to pay the debt. In Scotland the equity of redemption is more usually called a reversion.

REDEMPTIONISTS, one of the names of an order of monks devoted to the redemption of Christian captives from slavery. They are more frequently called Trinitarians (q.v.).

REDEMPTORISTS, called also Liguorians, a congregation of priests founded by St. Alfonzo Liguori (q.v.).

REDEYE, or Rudd, *Leuciscus erythrophthalmus* (see Leuciscus), a fish of the family *Cyprinidæ*, common in lakes, slow rivers, fens, etc., in many parts of Europe and in England. It much resembles its congener the roach (q.v.), but is shorter and deeper. It is a richly-colored fish. The name rudd refers to the color of the fish, the name red-eye to that of its iris. The redeye is better eating than the roach. It is readily caught by a baited hook. It sometimes attains a weight of 2 lbs.

REDFIELD, Isaac Fletcher, ll.d., 1804-76; b. Vt.; graduated at Dartmouth college; studied law and practiced in Vermont, and later in Boston. He became a member of the Vermont supreme court in 1835, and chief-justice in 1852. From 1857 to 1861 he was professor of medical jurisprudence at Dartmouth college. In 1867 he was a member of the commission to settle disputed claims between this country and Great Britain. He was editor of the Philadelphia *Law Register;* edited an edition of *Greenleaf on Evidence;* and is the author of *Law of Railways*, *Law of Wills*, *Law of Carriers*, and *Leading American Cases*—all legal treatises of the highest practical value.

REDFIELD, William C., 1789-1857; b. Conn.; removed to New York in 1825. He studied steam navigation, investigated the causes of steam explosions, and in a number of pamphlets urged the necessity of a thorough system of inspection. In 1828 he advocated a system of railroads from the Hudson to the Mississippi. In 1831 he published his *Theory of Storms*. He published many papers on meteorology.

REDGRAVE, Richard, b. London, 1804; student of art at the Royal academy; exhibited in 1837 a work which met with great success, called "Gulliver on the Farmer's Table." He is a painter of landscapes and *genre* pictures; illustrated Thomson's *Seasons* and Goldsmith's *Deserted Village;* and among his most celebrated works are "Country Cousins," in the South Kensington museum, and "The Sempstress," illustrating Tom Hood's *Song of the Shirt*. In 1857 he became a member of the Royal academy; in 1875 surveyor of her majesty's pictures and inspector-general of art schools, for which he had an original system and course of instruction. He has published works on art and artists; an *Elementary Manual of Color;* and with his brother Samuel, *A Century of Painters of the English School*, with critical notices of their works, 1866.

RED-GUM is the popular name for the papulous disease of the skin known to the physician as *strophulus*. It is a florid eruption, usually occurring in infants before or during their first dentition, and appearing on the most exposed parts, as the face, neck, arms, and hands, from whence it sometimes extends to other portions of the body. It occurs in minute red pimples, irregularly arranged, with occasional red patches, and sometimes a few interspersed vesicles. White pimples, popularly known as *white gum*, are also sometimes intermingled with the red papillæ. Strophulus is almost always an acute disease, seldom lasting more than a month. It is almost always an innocent complaint, and often occurs without any marked disturbance of the general health. In severe cases the pimples cause a sensation of heat and itchiness, especially if the child is kept too warm, and slight febrile symptoms manifest themselves. Among the probable causes of this disease are the irritation caused by rough flannel next the skin, want of cleanliness of the skin—especially in relation to the child's excretions—the general disturbance of the system excited by teething, etc. Very little is required in the way of treatment further than to remove any obvious cause of the affection. Cold applications should be carefully avoided, lest they should translate the cutaneous irritation to some important internal organ. In the event of such a translation the child should be placed in a hot bath, and mustard poultices, or hot moist cloths sprinkled with turpentine, should be applied over the arms and chest.

RED HAND, in heraldry. A sinister hand erect, open, and couped or, the wrist gules, being the arms of the province of Ulster, was granted to the baronets of England and of Ireland as their distinguishing badge on the institution of that order in 1611, and is borne by the baronets of Great Britain and of the United Kingdom. It is assumed into the armorial coat, and may be borne upon a canton, or on an escutcheon, which may be placed either in the middle chief or in the fess point, so as least to interfere with the charges composing the family arms.

RED-HOT SHOT are cannon-balls heated to redness, and fired from cannon at shipping, magazines, wooden buildings, etc., to combine destruction by fire with battering by concussion. In the great bombardment of Gibraltar on Sept. 13 and 14, 1782, red hot shot was used with great effect by the defenders under the governor, gen. Eliott, the attacking squadron being completely silenced, and a large number of ships set on fire.

REDI, FRANCESCO, 1626–98; b. Arezzo; physician to the grand duke Ferdinand II. of Tuscany; of distinguished reputation as a medical practitioner, naturalist, scholar, and poet. He assisted in compiling the dictionary of the academy Della Crusca. He was the first promulgator of the germ theory. In 1685 he published *Bacco in Toscana*, considered the best of his poems. He wrote the lives of Dante and Petrarch. Among the most important of his scientific works are *Osservazioni Intorno alle Vipere* (1664); and *Esperienze Intorno alla Generazione Degl' Insetti* (1668).

REDING, ALOYS VON, the famous champion of Swiss independence, was b. in 1755, in the canton of Schwyz. After serving in Spain, he returned to Switzerland in 1788. As capt.gen. of the canton of Schwyz, he repulsed the French republicans, May 2, 1798, at Morgarten. After the formation of the Helvetic republic, Reding was one of those who eagerly worked for the restitution of the old federal constitution. In 1802 he founded in the eastern parts of Switzerland a league, with the intention of overthrowing the central government. When after the departure of the French almost all the cantons declared themselves against the Helvetic government, Reding called a general diet at Schwyz, which assembled Sept. 27, 1802, and occupied itself with the formation of a new independent constitution. Reding went to Paris, in order to win over the first consul to the proposed change. In spite of all his endeavors, however, he failed to succeed. The disarmament of the Swiss by a French army, and the acceptance of the act of mediation, put an end to his hopes and to his political activity. In 1803 he officiated still as landamman, or chief magistrate of Schwyz; but after that retired into private life till 1809, when he was invested once more with the same dignity. In 1813 Reding conducted the negotiations with the allies in regard to the neutrality of Switzerland. He died in Feb., 1818, leaving the character of an honest man, whose political career might have been more successful had he not been wanting in firmness of mind and of character.

RED JACKET (SA-GO-YE-WAT-HA), 1752–1830, b. N. Y.; chief of the Seneca Indians. During the revolution he was a runner for the British officers on the frontier. In 1784, at a council held at fort Stanwix, he opposed with great eloquence a proposed treaty between the United States and the Sioux for the cession of the lands of the latter tribe. Some years later he had an interview with Washington, who gave him a silver medal. In 1807 he informed the Indian agent of a plot by Tecumseh to induce the Senecas to join an alliance against the United States. In 1812 he rendered considerable services to the Americans. During the latter part of his life he was a confirmed drunkard. He was an eloquent orator, and possessed great influence with his tribe, whom he endeavored to inspire with a contempt for everything English.

RED-LIQUOR, a chemical compound much used by dyers. It is a crude acetate of alumina, and is commonly prepared in dyeing establishments by dissolving a quantity of alum in boiling water, and separately dissolving, also in hot water, three-fourths as much acetate of lead. The two solutions are next mingled together; and after settling, the clear fluid, which is the red-liquor, is poured off. The sediment is sulphate of lead.

REDOUBT' is a small fort of varying shape, constructed for a temporary purpose, and usually without flanking defenses. The term is vague in its acceptation, being applied equally to detached posts and to a strong position within another fortress. Redoubts as a general rule do not exceed 40 yards square, with 4 guns and a garrison of 320 men. Redoubts are made square, pentagonal, and even circular. Each redoubt has parapet, ditch, scarps, banquette, etc., as in regular fortification; but it is commonly rather roughly constructed, haste and unprofessional labor precluding mathematical accuracy. The entrance may be by a cutting through the parapet, the cutting being covered within by a traverse; or preferably, by an excavated gallery leading into the ditch, and thence by a ramp through the counterscarp. For the sake of flanking the ditch, and preventing an assaulting party from forming in it, caponnières of timber, loopholed, are sometimes formed; or, if the soil be stiff or chalky, a gallery may be cut behind the counterscarp, and loopholed toward the ditch. In some modern redoubts the line of each side is broken to afford flanking defense. Redoubts have the weak feature of not defending their own ditches, and of being approached at their salient angles with comparative impunity. They are therefore not adapted to a protracted defense, but as temporary field works, or in a war of posts, they are often of incalculable importance. Troops whose stability in the open field is doubtful are especially strengthened by redoubts in their line. Redoubts are particularly useful in fortifying the tops of hills, or commanding passes, or where the object is to occupy a hostile territory, or to feel the way gradually through a wooded country.

REDOUT KALÉ, a port on the Black sea coast, in the district Kutaïs of the Russian lieutenancy of Caucasia, is situated in a marshy region at the mouth of a small river, about 12 m. n. of Poti. It possesses a Russian fortress of considerable strength, fired by the Russians in 1854 to prevent its falling into the hands of the English. Population inconsiderable, though increasing.

REDPATH, JAMES, b. England, 1833; emigrated to this country in 1848. He was the organizer of the Redpath lyceum bureau of Boston; and was long connected with the New York *Tribune*, which he represented during the land league troubles 1880–81, attracting considerable attention by the violence of his language against the landlords. He was a pronounced abolitionist, and among his writings is a *Life of Captain John Brown* (1860).

RED POLE. See LINNET.

RED RIVER, the lowest western branch of the Mississippi, rises on the eastern border of New Mexico, flows eastward, separating Texas from the Indian territory, thence s.e. through Louisiana, and enters the Mississippi 341 m. from its mouth. It is 2100 m. long, and receives numerous branches, the Washita, Negro, Big and Little Wichita, etc. Near its source, the s. branch runs for 60 m. between perpendicular banks, 600 to 800 ft. high. It is navigable for 8 months of the year to Shreveport. Thirty m. above this place is the great Red river raft, formed of driftwood, which blocks up the river for 60 or 70 miles. Its other important towns are Alexandria and Natchitoches.

RED RIVER (*ante*), the southernmost of the great tributaries of the Missisippi. The peculiar color from which it derives its name is attributed to the red clay of the gypseous formation which constitutes a portion of its bed. It rises in the Panhandle or n.e. section of Texas, in lat. 34° 40′ n. and long. 103° 2′ w., its source being the fissures of the Llano Estacado or Staked Plain, a barren and rainless tableland about 2,450 ft. above the sea. Following an e. direction it first passes through an immense cañon of some 100 m. in length, owned and occupied by Comanches and Staked Plain Indians, who have effectually resisted all attempts at exploration; then forms the dividing line between Texas and Indian territory, being the entire s. boundary of that territory. At Fulton, Ark., it makes a sudden bend, and for the rest of its course pursues what is in the main a s.e. direction, though with many windings, until it enters the Mississippi about 31° north. Its chief tributary is the Washita river, which it meets some 25 m. above its mouth; the other affluents, like the North Fork, the Big Wichita, etc., are of minor importance. The total length of the Red river is estimated at about 1550 m., and the area drained by it at about 97,000 sq.m., a large proportion of which area is remarkable for its fertility. Its broadest part (2,700 ft.) is just below where it issues from the cañon already mentioned, and for more than 100 m. thereafter it flows in a very wide and shallow channel, and then gradually contracts, while its bed deepens, until at its confluence with the Big Wichita river, 400 m. from its source, it measures only 600 feet. Thereafter its width is rarely more than 800 ft. until it nears its mouth, where it stretches to some 1800 feet. Its greatest depth is about 50 feet. In the upper part of its course, where the channel is wide, it is never more than 6 or 8 ft. deep even in the flood times, which are frequent. The fall of the river from its source to its meeting with the Big Wichita is very rapid, being nearly 1500 ft., thence to Fulton about 800 ft., and from Fulton to its mouth, where it is 50 ft. above the gulf level, only 188 feet. During the low water seasons (from June or July until December) the mouth of the river cannot be entered by boats of more than 2 ft. draught. For steamers of light weight it is navigable as far as Shreveport, La., for seven or eight months in the year, but as far as Fulton for only three or four months. For smaller vessels it is navigable at high water for about 1250 m. above its mouth. Just below Shreveport, navigation was formerly impeded by the great raft, an immense collection of timber and driftwood extending thence as high up as Great Echore, a distance of 15 miles. The U. S. government in 1833 undertook the removal of this obstruction, and after various abortive efforts lieut. Woodruff in Nov., 1873, succeeded in cutting through the raft a navigable channel, which can be kept open at slight annual expense.

RED RIVER, a parish in n.w. Louisiana, on both sides of Red river, and e. of Bayou Pierre; 400 sq.m.; pop. '80, 8,573—8,540 of American birth, 6,067 colored. The surface is low, swampy but fertile; covered in great part by forests of pine, oak, and cypress; cotton and corn are the staples. Co. seat, Coushatta Chute.

RED RIVER, a co. in n.e. Texas, drained by Red river, its n. boundary, and by Sulphur fork; intersected by the Texas and Pacific railroad; 1000 sq.m.; pop. '80, 17,194—17,056 of American birth, 6,287 colored. The surface is rolling and fertile; corn, cotton, pork, and cattle are the staples. Co. seat, Clarksville.

RED RIVER OF THE NORTH rises in a cluster of lakes in w. Minnesota, U.S., near the sources of the Mississippi, and runs n., separating Minnesota from Dakota, into the British possessions, and empties in lake Winnipeg, about 500 m. from its source, watering a beautiful country, and receiving numerous branches, the chief of which are the Cheyenne, the Pembina, and the Assiniboine.

RED RIVER SETTLEMENT. See MANITOBA, *ante*.

RED ROOT, *Ceanothus*, a genus of plants of the natural order *rhamnaceæ*, consisting of deciduous shrubs with simple alternate leaves and large red roots, whence their common name. The common RED ROOT of North America (*C. Americanus*), which abounds from Canada to Florida, is a shrub of 2 to 4 ft. high, with beautiful thyrsi of numerous small white flowers. It is sometimes called *New Jersey Tea*, because an infusion of the dried leaves is occasionally used as tea, and was so especially during the American war of independence. The plant is also used for dyeing wool of a cinnamon color. A strong infusion of the leaves has been found useful in aphthous affections, in the sore throat of scarlet fever, and in dysentery.—A number of species are found in different parts of North America, some of them very beautiful, especially *C. azureus*, a Mexican shrub, with elongated thyrsi of brilliant blue flowers. Some of the species grow very well in Britain; the Mexican ones require protection from frost in winter.

REDRUTH, a t. of Cornwall, consists chiefly of one long street, which stands on a hill, in the center of a famous mining district, 9¼ m. n.w. of Falmouth. Iron foundries are in operation; but the principal product of this vast mining district is copper. In the vicinity are many mines, which are worked by large steam-engines. By railway there is easy communication to St. Ives and Falmouth Bays. Pop. '71, 10,685.

RED SANDSTONE was the term formerly applied to the combined Devonian and Permian rocks, when their relations to the carboniferous strata were unknown. The discovery that one set of the red sandstone was below the coal, while the other was above it, caused their division into the old red (q.v.), or Devonian, and the new red, or Permian (q.v.). For some time after this division, the original term red sandstone was retained by a few geologists to characterize the newer set of red rocks, but it is now quite given up.

RED SEA, or ARABIAN GULF, an inlet of the Indian ocean, in form a long and narrow gulf, stretching n.w. from the strait of Bab-el-Mandeb (lat. 12° 40′ n.), by which it communicates with the gulf of Aden, to the isthmus of Suez (lat. 30° n.), which parts it from the Mediterranean sea. It separates Arabia on the e. from Egypt, Nubia, and Abyssinia on the west. Its extreme length is over 1400 English m.; it varies greatly in breadth—from about 20 m. at the strait of Bab-el-Mandeb, to upward of 230 at about lat. 16° 30′. At Râs (cape) Mohammed (lat. 27° 40′ n.), the sea is parted into two arms or smaller gulfs, which inclose between them the peninsula of Mount Sinai; that on the w., continuing the direction of the main body of the sea, is the gulf of Suez (Bahr-es-Suweis), of which the strait of Jubal or Jublah forms the entrance; its length is about 180 m.; extreme breadth (about lat. 29°), upward of 30. The e. arm, called the gulf of Akabah (Bahr-el-'Akabah), is entered by the strait of Tirân, and runs n.n.e. to lat. 29° 30 north. Its length is upward of 100 m.; greatest breadth, rather more than 15. The depth of the Red sea varies considerably, but is in many places very great; the deepest sounding is marked as 1054 fathoms, in lat. 22° 30′. Southward of 16° it is comparatively shallow; but the shallowest part of the whole sea is the gulf of Suez, which decreases in depth from 40 or 50 fathoms at the entrance to 3 fathoms in Suez harbor, at the n. end, where the gulf, which is supposed in ancient times to have extended considerably further n., has apparently been filled up by the sand washed up by the strong tides, or drifted in by the winds. The gulf of Akabah is much deeper; it is, in fact, a narrow, deep ravine, with steep and rocky sides, forming the termination of the long valley of the Arabah, running n. into the Dead sea. The basin of the Red sea itself is the lowest portion of a deep valley lying between the highlands of Africa on the w., and the lofty plateau of the Arabian hills on the e., which latter, rising at some little distance inland, leave for the most part a sandy and sterile tract along the sea. The navigation of the Red sea has always been accounted difficult and dangerous, owing to the prevalence of violent winds, and the number of islands, shoals, and coral reefs, which line the shores. The coral reefs extend generally in parallel lines along the coast; they abound in all parts, but are especially frequent on the Arabian side, where the navigation is consequently very intricate. The coral is very beautiful, often red or reddish in color, but more commonly white. The islands generally occur singly, but between the parallels of lat. 15° and 17°, they are found massed in two groups—the Farsan (q.v.) islands on the eastern, and the Dhalac (q.v.) islands on the western side. In mid-channel, s. of Râs Mohammed, there is generally a width of 100 m. clear. Along this channel, the winds are constant throughout the year in one of two directions: from May to October, the n.w. monsoon blows; for the rest of the year, the s.e. is the prevailing wind, and the water in the northern part of the sea is then raised to a higher level than the Mediterranean. It had been generally supposed that the level of the Red sea was more than 30 ft. higher than that of the Mediterranean, but it is now known, from careful observations, that the levels of the two seas are really the same. The principal ports are, on the Arabian side, Mocha, Jeddah (the port of Mecca), and Yembo (the port of Medinah); on the w., Suez, Cosseir, Suakin, and Massowah. The origin of the name Red sea has given rise to a variety of conjectures, and has never yet been satisfactorily settled. It is supposed to have been so called from the name Edom (red), as the mountains of that country are washed by the waters of the gulf of Akabah; from the red and purple coloring of the rocks which in some parts border it; from the red color sometimes given to the waters by animalcules and sea-weed; or from the reddish tinge imparted to them in some places by the subjacent red sandstone and reddish coral reefs. To the Hebrews it was known as *Yam Sûph*, the sea of *weeds* or *sedge*. By the Greeks, in the earliest times, the name Red sea was given to the whole of the Indian ocean, including both the Red sea and the Persian gulf, and not distinctively to the former (which was then and afterward known as the Arabian gulf), though the name in later times gradually became restricted in its application.

From the earliest times the Red sea has been a great highway of commerce between India and the Mediterranean lands, and traversed successively by Egyptians, Phenicians, Hebrews, and Arabs. It is first mentioned in the book of Exodus, on occasion of the passage of the Israelites, which is supposed to have taken place a little s. of the present town of Suez. The first recorded navigation of the sea was in the time of Sesostris, in the 14th c. B.C. Three centuries later, Hebrew and Phenician ships traversed the Red sea on the voyage to Ophir, from the port of Eziongeber, at the head of the gulf of Akabah. The gulf of Suez was for many centuries apparently the seat of the Egyptian trade in this sea and to India. After the foundation of Alexandria, and during the dynasty of the Ptolomies and the Roman dominion, the trade with India was vigorously carried on, though the chief seat of traffic was moved further southward, to the towns of Berenice and Myos Hormos, which sent out annually large fleets to India. After the establishment of the Mohammedan empire in the 7th c., an important trade with India and China seems to have been carried on through the Red sea; and through it, in the period between the 12th and 15th c., the goods of the east passed to the Venetian factories in Alexandria, until the discovery of the route round the cape of Good Hope diverted the traffic with India into a different channel, and put an end to the commerce of the Red sea. Since the establishment of the so-called overland route to India, and the opening of the Suez canal in 1870, the Red sea has regained its importance as the highway of commerce between Europe and the east. See SUEZ.

For the classical geography of the Red sea, the *Geographi Græci Minores* of Müller (Paris, 1855), and the atlas appended to it may be consulted. Fuller information on the subject of the Red sea, its coasts, and adjacent lands, will be found in the elder Niebuhr's *Travels*, and *Description of Arabia;* in the *Travels* of Salt, Burckhardt, Rüppell, and others; in Wellsted's *Observations on the Coast of Arabia, &c.;* in Ehrenberg's work on the Coral Islands of the Red sea; Ritter's *Erdkunde*, vol. ii.; and the Admiralty Chart, based on the surveys of Moresby, Carless, and others.

REDSHANK. See SANDPIPER.

REDSHID PASHA, a celebrated Turkish statesman, and long the chief of the party of progress in Turkey, was b. at Constantinople about 1800. He accompanied his brother-in-law, the governor of the Morea, into Greece, and after his death, obtained the post of chief secretary in one of the government offices at Constantinople. On the outbreak of the Russian war (1828–29), he was charged with a mission in Bulgaria, and exerted himself effectually to protect the Christian subjects of the Porte from the fanatic rage of their Moslem neighbors; and on his return obtained from Mahmoud, who fully appreciated his character, a post in the foreign office. On the creation of resident representatives at foreign courts, Redshid pasha was sent to the courts of France and Britain, and applied himself diligently to the study of the language, manners, and political constitution of these countries; but was recalled in 1837, and nominated grand-vizier. His persuasive eloquence and firmness of character greatly aided the sultan in carrying out his plans for the better centralization of the administration, and for mercantile intercourse with foreign nations; but the old Turkish party were still too strong for him, and he was compelled to resign office, and return to Paris and London to support the Turkish against the Egyptian interests. Recalled by the death of the sultan, and the disaster of Nisib, to his old post, the foreign office, he succeeded, after a debate in council of three days' duration, in obtaining the hattisherif of Gulhane (Nov. 3, 1839), a species of constitutional charter, which, from the comparative weakness of its promoters, became a dead letter. The effects of his foreign diplomacy were soon apparent in the humiliation of the Egyptians in Syria; but a seraglio intrigue, which occasioned his dismissal, deprived him of the honor of concluding peace. From 1841 to 1845 he was the Turkish representative at the French court, and though recalled to fill the post of grand-vizier (Sept. 28, 1846), he found his influence at court greatly diminished under the new sultan. He was vigorously supported by sir Stratford Canning, the English ambassador, who was of the opinion that all hopes of a bright future to Turkey depended solely upon Redshid pasha. He was frequently deposed, and almost immediately recalled, according as the anti-reform party gained or lost the ear of the sultan; but the complications with Russia, which arose in 1853, threw the anti-reformers (who had counseled an obstinate disregard of all the Russian representations) into discredit, and Redshid pasha, more powerful than ever, was again recalled to the direction of foreign affairs. In 1854 he was again overcome by his political opponents, and retired from office, which he did not resume till after the peace of Paris. His reappointment as grand-vizier excited great hopes of further salutary reformations; but the French influence at the Porte was pertinaciously antagonistic, and he was twice forced to resign, and as often recalled. At last, worn out with harassing cares and toil, he was seized with an illness, to which he speedily succumbed, at his palace of Emmirgian, Jan. 7, 1858. Though a Turk, he was one of the most enlightened men of his time, and was well versed in foreign languages, general literature, and science.

RED SNOW. The apparent redness of snow, as seen from a distance, is often an effect of light, which adds a peculiar charm to mountain and winter landscapes, particularly in the mornings and evenings, when the rays of the sun fall most obliquely on the surface of the snow. But snow is occasionally found both in polar and alpine regions of a really red color. This phenomenon seems to have been observed by the ancients, as a passage in Aristotle apparently refers to it; but it attracted no attention in modern times till 1760, when Saussure observed it in the Alps, and from chemical experiments concluded that the red color was owing to the presence of some vegetable substance, which he supposed might be the pollen of a plant. The next observations on red snow were made in the arctic expedition under capt. Ross, when it was found extending over a range of cliffs on the shore of Baffin's bay for eight miles, and the red color penetrating the snow in some places to a depth of 12 feet. On the return of the expedition in 1819, the coloring matter, as then existing in the melted red snow, was subjected to careful examination by Robert Brown and by Francis Bauer, the former most eminent botanist pronouncing it to be an unicellular plant of the order *algæ*, while the latter referred it to *uredo*, a genus of *fungi*, and called it *U. nivalis*. Baron Wrangel afterward declared it to be a *lichen*, and called it *lepraria kermesina;* but Agardh and Dr. Greville of Edinburgh—the latter of whom obtained specimens from the Scottish island of Lismore—on further examination, returned to the opinion of Brown, an opinion which has since been fully confirmed, and the plant is generally known by the name *protococcus nivalis*, given to it by Agardh, or *palmella nivalis*, given to it by sir William Hooker. The motions of this microscopic plant in the earlier stages of its existence have led some observers, and among them eminent naturalists, to regard the organisms which they found in red snow as animalcules. See PALMELLACEÆ. But while no doubt is now entertained of its real nature, it is not impossible that animal as well as vegetable life may exist in red snow, and that real animalcules may have been observed. The red snow plant consists, in its mature state, of brilliant globules like fine garnets, seated on, but not immersed in, a gelatinous mass.

REDSTART, *Phœnicura ruticilla*, or *Ruticilla phœnicura*, a bird of the family *sylviadæ*, nearly allied to the redbreast, but having a more slender form and a more slender bill; the male in summer having the head, back, and wing-coverts gray; the forehead white, with a narrow black band at the base of the bill; the throat, sides of the neck, and face jet black; the wings brown, the tail and upper tail-coverts bright rufous chestnut, with a strip of dark brown on the centers of the two middle feathers; the rest of the underparts mostly pale chestnut. The female is grayish-brown, with neither the white nor the black on the head, and less red on the tail. The redstart is widely diffused over Europe, Asia, and the north of Africa. It appears in Britain as a summer bird of passage, and is found in almost all parts of the island. It is a bird of very lively manners, remarkable for the way in which it flits about, in and out of some hedge or bush, where it is in quest of insects. It has a very soft melodious song, which is continued during the breeding-season far into the night, and resumed at early dawn. In confinement it becomes very tame, and has been known to imitate the song of other birds, and even to learn a tune.—The blue-throat (q.v.) also belongs to the same genus.—The AMERICAN REDSTART, *Setophaga ruticilla*, is a small bird of the family *muscicapidæ*, or fly-catchers, common in most parts of North America, a bird of great beauty, and extremely active in its movements.

REDUCTION, in arithmetic, is the conversion of a quantity in one denomination to an equivalent one of a different denomination. In the reduction of a quantity from a higher to a lower denomination the process of multiplication is employed; and, contrarily, division is the needful process when a number of a lower denomination has to be reduced to an equivalent number of a higher.

REDUCTION, in Scotch law, means the annulling or setting aside of a deed or instrument, and thereby annihilating its legal effect. The action of reduction commences with a summons requiring the defender to bring the deed into court to be set aside, stating the reasons of reduction. The defender, if he defend the action, returns the summons, which implies that he intends to satisfy the production; i.e., to produce the document and maintain its validity. The action can be raised only by a person who has some title or interest connected with the matter.

REDUCTION OF METALS. A metal is said to be reduced to its metallic state when it is separated from the condition of a chemical compound in which it exists as an ore. This is generally effected either by the direct action of heat, or by heating the compound along with a *reducing agent*. Thus, when oxide of mercury is simply heated, the oxygen is given off as gas, and mercury or quicksilver appears as metal. Again, when sulphuret of lead is heated with iron, sulphuret of iron is formed, and the lead is reduced to its metallic state. In this case the iron is the reducing agent. The principal reducing agent employed in metallurgy is carbon, or rather the gas carbonic oxide, which is formed under certain conditions when carbon is burned. See METALLURGY, IRON.

REDUIT, in fortification, is a central or retired work within any other work, intended to afford the garrison a last retreat, whence they may capitulate. It is commonly of masonry, loopholed, and often circular. Many engineers doubt the use of reduits altogether, as blocking up the working space, being themselves inconvenient for the men, and incapable of protracted defense, while they frequently mask the fire of other works more to the rear.

RED-WATER, also known as bloody urine, moor-ill, and hematuria, is a disease of cattle, and occasionally of sheep; it depends upon the eating of coarse indigestible innutritive food, on continued exposure to inclement weather, and on other such causes, which lead to a deteriorated state of the blood. In England and Ireland it affects cattle of all ages and of both sexes; but in Scotland it is most common amongst milk cows within a fortnight after calving. The appetite and rumination are irregular, the bowels speedily become constipated, and the urine reddened with the broken-down red globules of the blood. In the more advanced stages of serious cases the urine is black. A dose of physic must at once be given, and for an adult animal may consist of ½ lb. each of common and Epsom salt, 3 oz. of sulphur, and a pound of treacle, mixed together in two bottles of water. Roots should be withheld, and the food consist of sound hay with a little cake. A full supply of pure water is further essential. Weakness, which is apt to supervene, may be warded off by giving several times daily two ounces each of gentian and ginger in a quart of ale. To prevent red-water, attend to feeding and watering, place rock-salt in the pastures and yards; and, as has been successfully done in Cheshire and other English counties, improve the grazing-lands, notorious for the production of the disease, by draining, liming, and manuring; and where these means are ineffectual, by plowing them up and cropping them for a few years.

RED WILLOW, a co. in s.w. Nebraska, adjoining Kansas; drained by the Republican river and Red Willow creek; about 725 sq.m.; pop. '80, 3,044—2,771 of American birth. The surface is rolling with little timber. The soil is fertile. The principal production is corn. Co. seat, Indianola.

REDWING, *Turdus iliacus*, a species of thrush (q.v.), well known in Britain as a winter bird of passage. It spends the summer in the northern parts of Europe and Asia, and even occurs in Iceland; its winter range extends to the Mediterranean. In size, it is about equal to the song-thrush or mavis. The general color is a rich clove-brown on the head, upper parts of the body, and tail; the wing-feathers darker, but with lighter external edges; the lower parts mostly whitish, tinged and streaked with brown; the under wing-coverts and auxiliary feathers bright reddish-orange. The redwing arrives in Britain rather earlier than the fieldfare (q.v.), and, like it, congregates in large flocks. It has an exquisite song, which it pours forth from the summit of a high tree, gladdening the woods of the north.

REDWING, a city in s.e. Minnesota, on the s. bank of the Mississippi river; pop. about 7,000. It is the co. seat of Goodhue co., 6 m. s. of the point where the Cannon river empties into the Mississippi, on the river division of the Chicago, Milwaukee, and St. Paul railroad. It is 58 m. below St. Paul by water, 41 m. by rail, and 63 m. n.w. of Winona. It is built on a plain nearly level with the river, the bluff on the s.w. rising to the height of 300 feet. It contains 13 churches, public schools, an opera house, a music hall, a court-house, 3 banks, and 8 newspapers; and is the seat of the Redwing collegiate institute. It is the center of a great wheat-growing country, large quantities of which are exported from this market. Its industries consist of the manufacture of flour, agricultural machinery, steam-engines, lumber, etc.

REDWOOD, the heart-wood of *adenanthera pavonina* (*leguminosæ*), a large tree growing in India, where it is called *rukta-chundun*, and is much used in dyeing red. Small quantities are brought to this country for the same purpose, but it is not in much demand.

REDWOOD, a California conifer, the *sequoia sempervirens*, growing upon the Coast mountains of that state. It is next in size to the *sequoia gigantea*, or "big tree." See CALIFORNIA. It often attains a height of 250 ft, and sometimes 280 ft., with a diameter, in the largest, of 15 feet. It furnishes excellent lumber. The green wood has a fine red color, but on exposure to the air and light it fades.

REDWOOD, a co. in s.w. Minnesota, drained by the Minnesota, Big Cottonwood, and Redwood rivers, on the Chicago and North-western railroad; about 1190 sq.m.; pop. '80, 5,373—3,767 of American birth. The surface is rolling. The soil is fertile. The principal productions are corn, wheat, and oats. Co. seat, Redwood Falls.

REDWOOD, ABRAHAM, 1710–88; d. Newport, R. I.; founder of the Redwood library of Newport, to which he gave £500. The library building was completed in 1750. He was a member of the society of Friends, and emigrated from Antigua, West Indies.

REE, LOUGH, a lake in the middle of Ireland, between Connaught on the w. and Leinster on the e., is an expansion of the river Shannon (q.v.).

REED, the common English name of certain tall grasses, growing in moist or marshy places, and having a very hard or almost woody culm. The COMMON REED (*phragmites communis*, formerly *arundo phragmites*) is abundant in Britain and continental Europe, in wet meadows and stagnant waters, and by the banks of rivers and ditches. It grows chiefly in rich alluvial soils. The culms are 5 to 10 ft. high, and bear at the top a large much-branched panicle of a reddish-brown or yellowish color, having a shining appearance, from numerous long silky hairs which spring from the base of the spikelets. The two outer glumes are very unequal; and the spikelet contains 3 to 4 perfect florets, with a barren one at the base. The culms, or stems, are used for making garden screens, for light fences, for thatching houses and farm-buildings, for making a framework to be covered with clay in partitions and floors, for battens of weavers' shuttles, etc. So useful are reeds in these ways, and particularly for thatching, that it is found profitable in some places to plant them in old clay-pits, etc. Probably they might be planted with advantage in many peat-mosses, where they are now unknown. The plant is not very common in Scotland; but in the fenny districts of the e. of England it covers large tracts called *reed-ronds*, and similar tracts occur in many parts of Europe.—Nearly allied to this is *arundo donax*, the largest of European grasses, plentiful in the s. of Europe, and found in marshy places as far n. as the s. of the Tyrol and of Switzerland. It is 6 to 12 ft. high, and has very thick, hollow, woody culms, and a purplish-yellow panicle, silvery and shining from silky hairs. The woody stems are an article of commerce, and are used by musical instrument makers for reeds of clarionets, mouthpieces of oboes, etc. They are also made into walking-sticks and fishing-rods. The creeping roots contain much farina and some sugar.—*Arundo karka* is supposed to be the grass called *sur* in Sinde, of which the flower-stalks are very fibrous; and the fibers, being partially separated by beating, are twisted into twine and ropes.—The Sea Reed is *ammophila* (q.v.)—or *psamma—arundinacea*.

REED. See Loom.

REED, in music, the mouthpiece of a hautboy, bassoon, or clarionet. Also, a piece of metal with a brass spring or tongue attached to it in such a way that the admission of a current of wind causes it to vibrate and sound a musical note. The reed is of two kinds, the *beating* reed and *free* reed. The former is used in the reed-pipes of an organ (q.v.), and requires to be placed within a tube in order to produce a musical sound. It consists of a metallic cylinder, with the front part cut away, and a brass spring or tongue placed against the opening, and attached at the upper end. The admission of air to the pipe in which the reed is placed causes the tongue to vibrate against the edge of the opening, so as to cover and uncover the slit, through which the air passes to the pipe above, the regularly repeated beat producing a musical note, dependent for its pitch on the length of the tongue, which is regulated by a strong spring of wire pressing against it. The quality of the sound is determined to a large extent by the length and form of the pipe in which the reed is placed. The *free* reed differs from the beating reed in this, that the tongue is a little smaller than the opening, and strikes, not the edge of the opening, but the air. The admission of a current of wind causes it to yield so as to let the air pass, while, after recovering its position, it is carried by its momentum equally far on the other side, and continues vibrating so long as the current of air is continued, the result of the pulsations being a musical note. The invention of the free reed has been ascribed to M. Grenié, a Frenchman, who brought it into use, but it has been long known to the Chinese. Its note is more smooth and mellow than that of the beating reed, and it has the advantage of not requiring a pipe, which is a necessary appendage to the latter. Besides being occasionally adapted to organ-pipes, it is used without a pipe in the harmonium (q.v.).

REED, Andrew, d.d., 1787–1862; b. London; worked at his father's trade of watch-making, spending his leisure in study; learned Hebrew and Greek; entered the collegiate and theological seminary at Hackney; was pastor of the Independent church in New road, East London, for 50 years. One of the most successful preachers, and pastor of one of the largest churches of the metropolis, he yet found time to establish and visit the Hackney grammar-school and five national benevolent institutions. He established schools for the children of sailors, founded the first penny bank for savings, and was active in promoting Sunday and day schools for the industrial classes. He had remarkable power in the pulpit and on the platform. He wrote many works on practical theology; also many hymns. In 1835 he visited the United States as a delegate of the Congregational union of Britain, and on his return published *Visit to the American Churches*, 2 vols.

REED, Sir Charles, 1819–81; b. England; elected to parliament for Hackney in 1872; visited the United States in 1873 as delegate to the evangelical alliance. He was president of the Sunday-school union of England and Wales, and proprietor of the London *Daily News*.

REED, Edward James, b. England, 1830; educated at the scientific and naval construction school at Portsmouth; became a recognized authority on ship-building, and secretary of the naval architects' institute. In 1866 he was appointed by the government chief naval constructor, and built many iron-clads. There was some dissatisfaction with his turret ships, and in 1870 he resigned his office. In 1874 he was returned to parliament as a liberal. He has published several papers on iron-ship-building and kindred topics.

REED, Henry, ll.d., 1808–54; b. Philadelphia, graduated at the university of Pennsylvania, 1825; studied law, and was admitted to the bar in 1829. In 1831 he became an instructor in the university of Pennsylvania, and in 1835 professor of rhetoric and English literature. He published several lectures and essays on English history, language, and literature, the most important being *Lectures on English Literature* (1855).

REED, Joseph, 1741–85; b. N. J.; educated at the college of New Jersey. He studied law in England, began practice at Trenton, and in 1767 became deputy secretary of New Jersey. On his return in 1770 from a second visit to England, where he married, he removed to Philadelphia, served on the committee of correspondence, and was president of the first Pennsylvania convention in 1775. The same year he was a delegate to the continental congress and became Washington's secretary and aid-de-camp. He was adjt.gen. during the New Jersey campaign, whose success was due in no small degree to his knowledge of the ground. He declined the posts of chief-justice of Pennsylvania and brig.gen., and remained in the army as a volunteer without pay. He was a member of congress in 1778, and signed the articles of confederation. At this time gov. Johnstone, one of the British commissioners, offered him £10,000 and the best office in America if he would exert himself to bring about a settlement of the quarrel between the colonists and Great Britain. Reed replied: "I am not worth purchasing; but such as I am, the king of Great Britain is not rich enough to buy me." He was president of the Pennsylvania supreme executive council 1778–81, suppressed the revolt of the Pennsylvania line in the latter year, and had previously caused the trial of Arnold for maladministration. Bancroft's charge, in his *History*, that Reed was in British pay, has given rise to a sharp controversy, and is not usually deemed well supported.

REED, WILLIAM BRADFORD, LL.D., 1806–76; b. Philadelphia; graduated at the Pennsylvania university, 1822. He studied law and began practice after his return from Mexico, where he went in 1825 as private secretary to the U. S. minister. In 1838 he was made attorney-general of Pennsylvania, and in 1857 minister to China, where he negotiated the treaty of 1858. He contributed articles to the New York *World* and *Quarterly Review*, and published a number of biographical, literary, and historical papers.

REED INSTRUMENTS. The Chinese appear to have had an instrument comprised in a series of tubes with tongues, played upon by the mouth, as early in their history as we know anything about them. For the accordion we are indebted to Germany, where it was invented in 1829. Reed organs were invented in the United States, the first patent having been taken out in 1812, and including all reed instruments. It was not until five or six years later that a reed organ was actually made, and then it was very imperfect. Between 1825 and 1835 a large number of reed instruments were devised, mostly intended to be played by hand, as in the case of the concertina. The reed organ was, in fact, an enlargement of the accordion, conceived when that instrument had grown to a size that was unwieldy. This became an instrument with free reeds and without pipes, supplied with wind by the working of the foot. Under the names of seraphine, melodeon, and harmonium, it was gradually improved until it became an instrument of great power and sweetness. The melodeon was greatly improved by Mr. J. Carhart as early as 1836, and ten years later his instruments were being largely manufactured, and became very popular. In his instrument the reeds were acted upon by inflowing streams of air, by means of a special arrangement of the bellows. This was still further improved later on by Mr. E. P. Needham. A new discovery in this direction was that of the effect produced by curving or twisting the reeds, and was made by Mr. Emmons Hamlin of Rome, N. Y., in 1848, and applied to the now well-known Mason & Hamlin organ. At the Paris exposition of 1855, the American reed organs produced a marked impression, and this has been increased with the promulgation of each new improvement in these instruments. See HARMONIUM, *ante.*

REED MACE. See TYPHA.

REED WARBLER. See WARBLER.

REEF, in naval matters, is a portion of a sail included between the bottom of the sail and a parallel row of eyelet-holes a short distance above it, or between such row of eyelet-holes and a parallel row higher up. The object of the reefs is to reduce the size of the sail when the wind becomes boisterous. For this purpose cords are inserted at each eyelet-hole, which, when the sail is unreefed, hang freely. When the intention is to take in a reef, the sail is slightly lowered; the men climb out along the yard or boom below its lower edge, fold the loose sail on the yard, and fasten the reefing-lines securely round the yard and sail thus folded. There are also systems of small ropes in some ships by which the sail may be reefed from the top without the men incurring the danger of going out on the yard during tempestuous weather.

REEL, a lively dance peculiar to Scotland, which may be danced by two couples, but admits a greater number. The music is in general written in common time of four crotchets in a measure, but sometimes in jig time of six quavers.

REEL-WINDING MACHINE, a beautiful contrivance, now used by the manufacturers of sewing-thread. It is for the purpose of winding the thread on to the reels upon which it is sold for use; and not only does it turn a number of reels round so as to wind the cotton upon them, but, by a peculiar arrangement, every turn is so managed that the cotton is reeled with the most beautiful regularity, each turn of the thread being laid on by the side of the previous one, and never crossing it.

RE-ENTERING ANGLE, in fortification, is an angle in the line of works of which the apex points away from the front. As an example, the flanks of a bastion make re-entering angles with the adjoining curtains. Advantage is commonly taken of the comparatively sheltered position of these angles to form *places d'armes* for the assembly of troops.

RE-ENTRY is a legal term used in leases, whereby the landlord stipulates for power to re-enter the premises in certain conditions, such as the non-payment of rent after the lapse of a specified period from the time it became payable. Before, however, the power of re-entry can be exercised, all the conditions must be strictly complied with.

REES, ABRAHAM, 1743–1825; b. Wales; studied for the ministry at Hoxton academy. He was for many years mathematical tutor there, and pastor of a Presbyterian church in Southwark. In 1783 he was settled over a church in the Old Jewry. He was a fellow of the Royal and Linnæan societies. He edited *Chamber's Cyclopædia,* 1781–86, and *Rees's Cyclopædia,* 45 vols., 1802–19.

REEVE (Sax. *gerefa,* Ger. *graf*), a magistrate existing in early times in England and elsewhere in northern Europe, whose duties were at first principally fiscal. In the Saxon period in England, he represented the lord of a district, whether township or hundred, at the folkmote of the county; and within his district he levied the lord's dues, and performed some of his judicial functions. The word still survives in the shire-reeve or sheriff (*scyr-gerefa*), who was at first assessor to the ealdorman or earl, who, along with the bishop, presided, but afterward became himself the presiding officer. Similar functions were exercised in boroughs by an elective officer called the portreeve. In Anglo-Saxon times all the English boroughs were subject to the rule of a portreeve, for whom the Norman conquerors substituted a bailiff, who, in the larger towns, was allowed to assume the appellation of mayor.

REEVE, a verb used in speaking of ropes, signifies the passing of a rope through any hole, dead-eye, block, or pulley, in conjunction with which it is to be used.

REEVE, HENRY, D.C.L., b. England, 1813; educated at Geneva and Munich. In 1837 he became registrar of the privy council, which office he retains. He became editor of the *Edinburgh Review* in 1855. Among his works are a translation of De Tocqueville's *Democracy in America,* and of Guizot's *Washington;* and the *Journal of the Reigns of King George IV. and William IV.,* by C. C. F. Greville.

REEVE, TAPPING, LL.D., 1744–1823; b. Long Island; educated at the college of New Jersey. In 1772 he began to practice law in Litchfield, Conn., where 12 years later he began the famous Litchfield law-school, the first in this country. He conducted this till 1820; after 1798 in association with judge James Gould. Many men eminent in the politics and the law in later years were pupils here. He was a justice of the Connecticut supreme court 1788–1814. He published legal treatises on the *Law of Descents* and *The Domestic Relations.*

REEVES, SIMS, an eminent tenor, b. at Woolwich in 1821. Before attaining his fourteenth year he was a clever performer on various instruments, and tolerably well versed in composition; and at that early age he was appointed organist and director of the choir in the church of North Cray in Kent. His musical education was conducted under J. B. Cramer, T. Cooke, and other artists of note. He first appeared in public as a baritone at Newcastle in 1839. His *début* was a complete success; and he acquired fresh fame in Scotland and Ireland. In order to perfect his voice and style, he went to Paris, and after studying there for some time, appeared a Milan in the tenor part of "Edgardo" in *Lucia di Lammermoor,* when his singing electrified the audience. He returned to England in 1847, and coming out at Drury Lane as "Edgardo," was immediately recognized as the first living English tenor, and was engaged in 1848 at Her Majesty's theater. In 1851 he was equally successful as first tenor at the Italian opera in Paris. One of his best original parts was in Macfarren's opera of *Robin Hood,* produced in 1860.

REFERENCE, as a legal term, means the sending by a court, or by agreement of the parties, the decision of a matter to an arbitrator, or to an officer of the court or master. In cases where parties, without going the length of commencing litigation, agree to arbitration, they usually execute a deed or agreement of submission; but after litigation has begun, if the judge think it would be better that an arbitrator should settle the dispute, an order of reference is drawn up for that purpose.

REFEREN'DARY, a name given in the early kingdoms of Europe to a public officer, whose duty was to procure, execute, and dispatch diplomas and charters. The office of great referendary to the monarchy of France merged eventually in that of chancellor.

REFINING OF METALS. The last operation connected with the smelting of copper, tin, lead, and some other metals, is usually called the refining process. With copper, for example, the impure or "blister" copper, containing from 95 to 98 per cent of the metal, alloyed usually with small quantities of iron, tin, antimony, etc., is melted in a refining furnace, and exposed to the oxidizing influence of the air. By this means, the foreign metals present become oxidized, and rise to the surface as slag, which is skimmed off; the oxide of copper, formed during the process, being afterward reduced by throwing coal on the surface of the melted metal, and stirring with a pole of green wood. The disengagement of gases from the wood during the "poling" causes the metal to splash about, and so expose every portion of it to the reducing action of the coal; thus the oxide of copper is deprived of its oxygen, and the copper rendered nearly pure.

Tin is also refined by throwing billets of green wood into it while in a melted state, which has the effect of bringing impurities to the surface as froth, in a somewhat similar way to the oxidizing of foreign metals in copper. See TIN.

Lead is purified from antimony and tin by an analogous mode of oxidation, and silver is separated from it by a special process. See LEAD.

The refining of iron is a name applied to the process for partially separating the carbon from cast iron, and is described under IRON. Of the less important metals used in the arts, zinc, antimony, and mercury do not usually undergo any special refining process; aluminium, it is said, will not afterward purify when once reduced to the metallic state; and nickel, of which German silver is largely composed, is refined by a process or processes kept strictly secret by manufacturers.

We may state here that no metal is ever quite pure in its commercial state, even though it has gone through the usual operation of refining, but all are to a certain extent alloyed with certain others. For the great majority of purposes, it is not necessary that metals should be chemically pure, and when it is, they can only be made so by refined chemical processes.

It will be readily understood, however, that it is always necessary to carry the refining of gold and silver further than the less valuable metals. To render gold sufficiently pure for manufacture into coin, an ingenious process has, within the last few years, been proposed, by which fused gold is mixed with about 10 per cent of black oxide of copper, and then stirred so as to oxidize any foreign metals which happen to be present. The oxide of copper does not fuse, but is disseminated through the melted metal, and oxidizes any tin, antimony, or arsenic, and causes them to rise to the surface, so that they may be skimmed off. Perfectly pure gold is prepared by dissolving the metal in aqua-regia—a mixture of nitric and hydrochloric acids—and precipitating silver (with which it is almost always alloyed) as well as any other foreign metals by chemicals which have no action on the solution of gold. The metallic gold is afterward precipitated as a finely divided powder, by a salt of iron, and is then fused and cast into bars.

Silver is rendered pure by dissolving it in nitric acid, filtering the solution, and then precipitating the metal with common salt as a chloride of silver. This is afterward mixed with sulphuric acid, and then, by introducing bars of zinc, a chloride of zinc is formed while the silver is reduced to the metallic state.

REFLECTION. See CATOPTRICS, HEAT, UNDULATORY THEORY. In the articles referred to, the laws of reflection are stated, illustrated geometrically, and deduced from the modern theory of the nature of light and radiant heat.

We may now *mention* one or two curious circumstances connected with reflection, which could not well be given in any of these articles.

In general, a reflected ray is more or less *polarized* (see POLARIZATION); and if the reflecting surface be metallic, or if it be formed of a substance of high refractive index, as diamond, it is in general *elliptically* polarized.

In various cases, principally known by the laborious investigations of Brewster (q.v.), the *color* of the reflected light not only differs from that of the incident light, but is different for different angles of incidence, and for different azimuths of the plane of reflection. The theoretical explanation of these very singular facts has not been as yet very satisfactorily given. In fact, the problem of reflection from the surface of a metallic or a crystalline substance is one which presents difficulties of a very formidable kind, principally from the want of definite data for the formation of a satisfactory fundamental hypothesis; and, in a secondary manner, from the intricacy of the requisite mathematical investigations.

RE'FLEX ACTION. See NERVOUS SYSTEM.

REFORM, PARLIAMENTARY, the name generally given to the acts which passed the legislature of the United Kingdom in 1832, by which an extensive change was made in the system of parliamentary representation. Parliamentary reform had for many years before been a topic of popular agitation. So far back as 1782, a motion by Mr. Pitt for a reform of the franchise was lost by a majority of 20, and similar motions in the years 1783 and 1785 by majorities of 44 and 74. The horror inspired by the excesses of the French revolution caused a reaction, and the repression for a time of all liberal tendencies; and it was not till some time after the close of the French war that the desire for reform again manifested itself. Mercantile distress had added to the popular dissatisfaction, which was fomented by the revolutions of 1830 in France and Belgium; and an adjustment of the inequalities of the representative system, with an extended franchise, was looked forward to as a panacea for all the ills under which the community labored. The demand for parliamentary reform became more imperious on the death of George IV. and accession of William IV. Meetings were held over all the country, and though there was no open rioting, a constant alarm was kept up. On the resignation of the duke of Wellington, Nov. 16, 1830, the celebrated reform ministry of earl Grey came into office. Parliament assembled on Feb. 3, 1831, and on Mar. 1 lord John Russell proposed his first scheme of reform. After a long and animated discussion, the bill passed the second reading by a majority of 1. On the motion for a committee, gen. Gascoyne moved, as an amendment, that the number of representatives for England and Wales should not be diminished; and the amendment being carried by a majority of 8, the ministry abandoned the bill, and resorted to a dissolution. The cry arose through the country of "The bill, the whole bill, and nothing but the bill;" and when the new parliament assembled on June 14, a large majority, including the whole of the county members for England, excepting four or five, were pledged to support the bill, which was again introduced on June 24, and passed the third reading of the house of commons by a majority of 113. The upper house, however, threw it out on the second reading, by a majority of 41, and parliament was immediately prorogued. It reassembled on Dec. 6, and on Dec. 12 the third reform bill was introduced in the commons by lord John Russell, which did not, like the former bills, diminish the number of members—a concession which the opposition considered as an improvement, and it had a majority of 116 on the third reading. In the lords, the second reading was carried by a majority of 9, and the bill ordered to be committed. In committee, lord Lyndhurst carried, by a majority of 35, a motion that the disfranchising clause should be postponed, and the enfranchising first considered; on which, the king having refused to accede to a creation of peers sufficient to carry the bill, the ministry resigned. A week of intense public agitation followed. The government were induced to resume office on the king granting them full powers to secure majorities by the creation of peers; but eventually that expedient was avoided by a sufficient number of lords absenting themselves to leave ministers a majority on the third reading, when the bill passed by a majority of 84, receiving the royal assent by commission on June 7. 1832. Reform bills for Scotland and Ireland were immediately afterward introduced and carried. For the details of the alterations made by these several measures on the distribution of members and the electoral qualification, see Parliament. The changes effected were so sweeping as to cause many of the advocates of reform to be apprehensive that the balance of the constitution would be disturbed by the preponderance of the democratic element; but the determination of the masses was such, that the conservative influences of the country were powerless to stay or modify the measure. Yet no sooner was the contest at an end than a reaction followed, falsifying equally the hopes of the supporters of the bill, and the fears of its opponents.

In 1854 a new reform bill was introduced by lord John Russell for a further extension of the suffrage; but it was unaccompanied with anything like popular excitement, and was withdrawn in consequence of the breaking out of the Crimean war. A reform bill brought in by Mr. Disraeli in 1859 was rejected in the commons by a majority of 39. and the consequence was a dissolution and change of ministry. The ministry of lord Palmerston and lord John Russell, which succeeded to power, introduced and afterward withdrew a reform bill.

No one, remembering amid what apathy that took place, would have expected, within so few years, to see the subject revive, and assume such large dimensions. Mr. Gladstone's speech of 1864 first gave new life, and his declaration, that it lay with those who refused the elective franchise to justify the refusal, sounded the commencement of the new agitation. At the general election of 1865, reform was necessarily much discussed. The death of lord Palmerston gave the country a ministry in which lord Russell led the house of lords, and Mr. Gladstone led the house of commons. This ministry was not long in attacking the subject, and the reform discussions of 1866, so valuable as preparing for the final settlement of the question, commenced. The ministry adopted a suggestion which Mr. Bright had made, and tabled first a bill dealing with the franchise alone. Its proposals were of a moderate enough description, its leading provisions being to give the franchise to occupiers of premises of the annual value of £7 in boroughs, and of £14 in counties. At the desire of the opposition, led by Mr Disraeli and lord Stanley, government introduced its redistribution of seats bill, and the two bills were combined and sent to committee together. In committee, parliament proved unmanageable. Several clauses were carried by the narrowest majorities, till at length, on the comparatively small question, whether "clear" or "ratable" annual value should be taken as the basis of the franchise, government was left in a minority of seven. The leaders, true to the traditions of party, resigned, and left the question of reform to the conservatives.

The resignation was beneficial to progress. In the autumn following it, numerous mass meetings, conducted in general with perfect order, were held; and some unlucky speeches of the opponents of any reduction of the franchise were employed more or less unfairly in order to get a starting-point for the kind of eloquence that such meetings require. It now became plain that the main drawback to reform, the alleged indifference of the working classes, had ceased to exist. Reform therefore became inevitable; and it was equally clear that if reform was to be carried by the conservatives, the country would not accept from them a measure of the moderate character which it would have gladly taken from the liberals shortly before.

The meeting of parliament in 1867, it is said, found the ministry of lord Derby and Mr. Disraeli still undecided. But it was necessary to do something. The queen's speech accordingly broached the matter; and in the beginning of the session, Mr Disraeli proposed to deal with the subject by way of resolution. His resolutions, however, were vague, and had to be withdrawn. Mr. Disraeli then (Feb. 25, 1867) made a speech, in which he proposed to bring in a bill, with a £6 rating franchise in boroughs, a £20 rating in counties, and with some of what were called "fancy" franchises. With the redistribution question he proposed to deal much as his actual bill afterward dealt. This proposed bill was understood to be a compromise with a section of the cabinet not favorably disposed to reform. However, as it did not succeed in making matters smooth, the leaders of the government are said to have reverted to what was their original policy. The dissentients, lord Carnarvon, lord Cranborne, and gen. Peel, then resigned, and (on of Mar. 18) the reform bill of 1867 was introduced.

The bill surprised the country. Mr. Disraeli has since said that, so far back as 1859, he and lord Derby came to the conclusion, that if the £10 line, at which the reform act of 1832 had fixed the borough franchise, were disturbed, there was no other fixed line tenable; and he has made the further revelation, that he spent the interval between 1859 and 1867 in educating his party to the belief that, if the borough franchise was to be dealt with at all, it must be dealt with in the boldest manner. His bill, therefore, carrying out this policy, proposed that all householders within boroughs who were rated for the payment of poor-rates should be entitled to vote. There were certain "securities" attached to this proposal. The householder must have resided two years in the borough, and must have personally paid his rates. Further, the "fancy franchises," which again made their appearance, had coupled with them what was called the "dual vote," the object of which was to give to every householder who possessed one of them a second vote in addition to the first, which his house would give him. In counties, the bill proposed a £15 rating franchise, and all existing franchises were permitted to remain. In redistribution of seats, the bill proposed to take the second member from each borough of less than 7,000 inhabitants, and to divide these seats, together with the seats taken from the corrupt boroughs, in nearly equal proportions between the larger counties and boroughs, giving one also to London university.

The bill was not permitted to pass without many alterations. Government, either influenced by a sincere desire for reform, or convinced that, as reform was at any rate unavoidable, it was better that it should pass under their management than under the management of their opponents, were quite resolved that a bill should pass. They yielded to the house whenever they well could, and when they could not, the threat of dissolution at once brought the house to reason. The result of the labors of the session admits of being shortly stated.

The borough franchise remained substantially as first proposed. Much of the session was lost in devising clauses by which the rating principle could be applied to those tenants whose landlords compounded for their rates. The principle was, however, maintained; and an amendment introduced by Mr. Gladstone, with a view of fixing the hard and fast line of £5, was rejected. But by a new clause, the system of compounding was put an end to, so that the franchise was really given to all householders except those excused from rating on the score of poverty. The period of residence, on the motion of Mr. Ayrton, was reduced from two years to one. On the motion of Mr. McCullagh Torrens, an important addition was made in the shape of the lodger franchise. Mr. Disraeli's bill of 1859 had contained a provision of the kind, and something like it was again added. It gives votes to all lodgers who have occupied for a year lodgings which would let unfurnished for £10, and who apply to be put on the roll.

The county franchise was reduced from £15 to £12 rating; and there was added (on Mr. Colville's motion) a reduction of the copyhold and leasehold franchise, giving votes to all owners or life-renters of the free annual value of £5 in property other than freehold, which continues to yield a 40s. franchise.

The dual vote was early abandoned, and its abandonment involved that of the "fancy" franchises. These have now only interest as matters of history; but as the name appears often in the discussions, it should be mentioned that, in their last form, they proposed to give votes to all who paid £1 annually in direct taxes (not including licenses), who belonged to certain of the better educated professions, or who had £50 in a savings-bank or in the funds. Mr. Mill's proposal to extend the franchise to women found 73 supporters. The vote by ballot was rejected, equally with the government proposal to take the vote by means of voting-papers.

The comparatively restricted proposals of the government with regard to redistribution of seats were considerably extended. On Mr. Laing's amendment, the limit at which boroughs then returning two members should hereafter return only one, was raised from 7,000 inhabitants to 10,000. This gave 38 seats to be distributed,* making, with the 7 seats forfeited for bribery by the boroughs of Lancaster, Yarmouth, Reigate, and Totness, 45 in all. Of these, 25 were given to the larger counties, which were severally divided into two or more districts for the purpose.† To boroughs, 19 new members were given—8 by way of additional members to boroughs already possessing members, and 11 to new boroughs.* To the university of London, one member was given. Mr. Laing's proposal to make the scheme of redistribution still more extensive, by applying to all boroughs having fewer than 5,000 inhabitants the system of grouping which prevails in Wales and Scotland, was rejected.

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* The boroughs from which one member each was taken were Andover, Bodmin, Bridgenorth, Bridport, Buckingham, Chichester, Chippenham, Chipping-Wycombe, Cirencester, Cockermouth, Devizes, Dorchester, Evesham, Great Marlow, Guildford, Harwich, Hertford, Honiton, Huntingdon, Knaresborough, Leominster, Lewes, Lichfield, Ludlow, Lymington, Maldon, Marlborough, New Malton, Newport (Isle of Wight), Poole, Richmond, Ripon, Stamford, Tavistock, Tewkesbury, Thetford, Wells, and Windsor.

† West Kent, North Lancashire, East Surrey (already having two members each), and South Lancashire (already with three members): were subdivided, and two members given to each division, which absorbed 7 seats: and the counties of Chester, Derby, Devon, Essex, Lincoln, Norfolk, Somerset, and Stafford, together with the West Riding (all already in two divisions, with two members

The only amendment of importance which the house of lords succeeded in making was the addition of the system of representation of minorities. By this system, persons voting in London, where four members are returned, cannot vote for more than three; and in the counties and boroughs which return three members, cannot vote for more than two. The object is to prevent a majority, which may possibly exceed the minority by only one man, from monopolizing the whole representation. The plan appeared first in lord John Russell's bill of 1854, and, having then been unpopular with both sides, does not appear to have been proposed since. Mr. Disraeli took occasion, in introducing his bill, to declare himself against it. Mr. Lowe proposed to add it in the commons; and his proposal was supported by such men as lord Cranborne among the conservatives, and Mr. Mill and Mr. Fawcett among the liberals. Mr. Bright joined the government in opposing it, and it was lost by a majority of 141. In the house of lords, its insertion was again proposed by lord Cairns, and carried by a very large majority, most of the conservatives voting for it against the government. When the lords's amendments were considered in the commons, it was the only one of them which was agreed to. It is hardly necessary to say that a scheme such as that of Mr. Hare, for carrying out the principle in a rigorous and complete manner, was found to be far in advance of the day.

The opportunity of passing the reform bill was taken to provide for some minor improvements. The inconvenience of having parliament dissolved by the demise of the crown was obviated, and it was provided that ministers of the crown and their subordinates changing from one office to another should not have to submit to re-election. A boundary commission was appointed to readjust the boundaries of the boroughs and counties. Mr. Fawcett's proposal to throw the necessary expenses of elections, such as the expenses of polling-places, sheriffs, etc., on the borough or county rates, was, however, rejected.

Such is the reform act (for England) of 1867. Its passing, in some shape or other, from the temper of the government and its power of controlling the house, was at no time in serious risk. The most critical period was when Mr. Coleridge's amendment was brought forward, with the view of making way for Mr. Gladstone's amendment of the £5 rating limit; and here the government were served by the defection from the liberals of "the tea-room" party—a large number of "extreme" and "independent" liberals, some of whom really preferred the *quasi* household suffrage scheme of the government, and others of whom were only resolved that a bill of some kind should pass. Mr. Gladstone's amendment was thus defeated.

Acts similar to the English one were passed for Scotland and Ireland in the session of 1868. The borough franchise for Scotland is substantially the same as for England, being conferred on every man who has for twelve months occupied, as owner or tenant, any dwelling within the borough, except he has been exempted from poor-rates on the ground of inability to pay, or has failed to pay. Scotland has also the £10 lodger franchise. In Scottish counties, proprietorship to the extent of £5 of clear yearly value confers a vote; the limit of the tenant franchise is £14. The Scottish act disfranchised seven English boroughs, and gave seven additional representatives to Scotland—two of these being assigned to the universities, and the rest to the larger towns and counties. The universities of Edinburgh and of St. Andrews return one member jointly; as do those of Glasgow and Aberdeen. The Irish act made no alteration in the county franchise, but reduced that of boroughs to a £4 rating occupation.

As thus chosen the house of commons was composed, in 1869, of the following representatives:

	Of Counties.	Cities and Boroughs.	Universities.	Total.
England and Wales	187	297	5	489
Scotland	32	26	2	60
Ireland	64	37	2	103
United Kingdom	283	360	9	652

REFORMATION. The *reformation* denotes the great spiritual and ecclesiastical movement which took place in Europe in the 16th c., and as the result of which the national churches of Britain, of Denmark, Sweden, Norway, and Holland, and of many parts of Germany and Switzerland, became separated from the church of Rome. In other countries, such as Hungary and France, the same movement detached large por-

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each), were divided into three parts, each represented by two members, which absorbed the other 18 seats.

* Birmingham, Leeds, Liverpool, Manchester, Merthyr-Tydvil, and Salford got each an additional member. The Tower Hamlets were subdivided, and got two additional members. Chelsea was made a borough, returning two members; and the following boroughs were appointed to return one each: Burnley, Darlington, Dewsbury, Gravesend, the Hartlepools, Middlesborough, Staleybridge, Stockton, and Wednesbury.

tions of the population from the Roman Catholic faith, yet without leading to a national disruption with the papacy.

The causes of this movement were manifold; but, as may be supposed, they present themselves in very different lights to members of the different religious communions.

To Protestants, the reformation appears as the natural result of causes which had long been at work, and which it needed but a fitting occasion to call into active operation. The church of Rome had gradually, from the 6th c., or the time of Gregory the great, extended not merely its influence, but its direct control and government, over all the countries of western Europe—in many places, as in Ireland, Scotland, and part of England, displacing the old national churches, which had been planted in earlier times, and which had survived under comparatively simple forms of government. Although some uncertainty may exist as to the exact constitution, doctrine, and discipline of the old Scoto-Irish church, there can be no doubt that it did not acknowledge the direct superintendence of Rome, and that it was only after a long and varying struggle, not terminating till the 12th c., that the popes fully established their authority, and set up over this ancient church a completed hierarchy connected with Rome. It is only by keeping this in view that some features of the reformation can be clearly understood and appreciated.

The natural result of the wide-spread supremacy of the Roman church was, that the spiritual aspects of the church became gradually more and more merged in its mere machinery of external government. Everything that could give power and efficiency to it as an institute was carefully watched and nursed; but when, in the course of the 15th c., and even earlier, spiritual life began to die out in the center of this vast system of ecclesiastical government in Rome itself, the baleful effects of such spiritual decay speedily began to tell through all its borders. The growing corruption showed itself in many forms—in a prevailing ignorance among the monks and higher clergy; in the perversion of ecclesiastical offices, and especially in the grossly materialistic abuse of spiritual privileges and censures. The ignorance of the monks is depicted in strong colors in the satires of Erasmus and Buchanan, and in such books as the *Epistolæ Obscurorum Virorum.* The great impetus which the friars had given to the papal power in the 13th c. had died out. They had sunk, from being zealous and active preachers, into bigots and mendicants, cumbering the ground. The secular clergy were hardly less corrupted; in many cases the higher dignitaries of the church had no interest in the spiritual duties of their office, and gave themselves up entirely to the pleasures of a worldly life, or, at best, to the duties of political or military activity. The revival of the old classical literature in Italy—the spirit of what is called the *renaissance*—accelerated this movement of spiritual decay. The papacy itself became half-pagan. The church was little cared for even as an organ of government; it was used as an engine of self-aggrandizement and the most extravagant luxury.

These general causes, however, might have proved inefficient to produce any such radical change as the reformation; they had been long felt and deplored. Wycliffe in England, and Huss and Jerome of Prague had denounced, in the most vigorous manner, the prevalent abuses; they had excited a widespread popular interest, and even to some extent secured royal favor. But the overbearing power of the church proved too strong for the reforming spirit in its earlier manifestations. In the midst of his evangelical activity, Huss was betrayed, through the promise of a safe-conduct, into making his appearance at the council of Constance in 1414. No sooner was he fairly in the power of the council, than he was confronted with certain articles of abjuration; and refusing to submit without being convinced, he was, in defiance of the promise made to him, condemned to be burned as a heretic. The rising spirit of reformation was temporarily quenched in the flames which consumed the intrepid martyr of Bohemia. The council did nothing effectual to repair the abuses which he had denounced. The church remained apparently strong after a temporary excitement and alarm.

In the mean time, however, throughout the 15th c., new seeds of preparation for the great work were everywhere ripening. The literary movement begun in Italy was spreading in Germany, in England, and elsewhere. Reuchlin arose in Germany, Erasmus in Holland; England welcomed the latter as a student in the early reign of Henry VIII., while he was engaged in preparing his edition of the Greek New Testament. Various manifestations of spiritual life showed themselves, especially in the Rhine country. The brethren of the Common Lot took up in a more evangelical form the succession of the brethren of the Free Spirit, whose teaching had degenerated into a species of spiritualistic pantheism. Gerhard Groot and Thomas à Kempis represent this comparatively evangelical tendency, and springing from them, various men—the best known of whom is John Wessel of Gröningen—have been called "reformers before the reformation." If we add to these influences the internal political agitations of the Germanic empire—whose traditional opposition to the papacy was by no means forgotten—the growth of a healthy political activity in many of the great municipalities of the empire, we shall find abundant incitements to the reformation in the social state of Europe, especially of Germany, and in the church in the beginning of the 16th c. It required only a definite spark to kindle the slumbering agitation, and this was not long wanting.

Whatever may be said of the doctrine of indulgences as theoretically stated, it is not denied by the most zealous defenders of the institution that it has at all times been liable to the gravest abuse; and it so happened that at the period in question the abuse had risen to a scandalous height. See INDULGENCE. An agent of this system, of the name of Tetzel, a Dominican friar, came into Saxony in the year 1517, and established himself not far from Wittenberg, for the purpose of disposing of papal indulgences. He was a man of low and unscrupulous character, gifted with great volubility, and he carried on his traffic in a peculiarly offensive and shameless manner. Luther, who had been recently created a doctor in the Holy Scriptures, and entered upon his career as a teacher in the university of Wittenberg, was roused to indignation by what he heard of the doings of this man. He saw the evil influence of the system upon the members of his own flock, and determined to raise his voice against it. "God willing, I will beat a hole in his drum," he exclaimed, with reference to the coarse vehemence with which Tetzel commended the value of his wares. He posted on the door of the church of Wittenberg his famous 95 theses, and thereby created such a popular excitement that Tetzel was silenced, and obliged to retreat from the field. This was the beginning of the reformation in Germany. Luther's attention once aroused to the working of the papal system, he proceeded to examine it in different aspects, and the result was, that his resolution to assail it strengthened as he advanced. Neither cajoling nor threats, neither the bland softness of Cajetan, nor the blundering polemics of Eck, were of avail to silence him. A papal bull was at length fulminated against him; and he consummated his audacity by burning the bull at one of the gates of Wittenberg, on the memorable 18th Dec., 1520.

About the same time, and without any concert whatever, a similar movement against the sale of indulgences took place in Switzerland. In 1520 the Franciscan friars, who had the charge of promulgating the indulgences there, were opposed by Zwingli, a preacher in Zürich. His opinions were declared to be heretical by the two great universities of Cologne and Louvain; but he declared himself unmoved by the voice of Catholic authority; the magistrates and people of the city supported him; and the result was the active spread of the reforming spirit, not only throughout Zürich, but the neighboring cantons of Schaffhausen, Basel, and Bern.

In the mean time Luther advanced in his work. He addressed the "Christian nobles" of Germany, loudly declaring that the time to rise against Rome was come. "Talk of war against the Turk," he cried; "the Roman Turk is the fattest Turk in the world; Roman avarice the greatest thief that ever walked the earth; all goes into the Roman sack, which has no bottom, and all in the name of God too!" Step by step he opened his eyes to the errors of the papacy, and no sooner reached a new conviction himself, than he launched it forth into the world. He pronounced against the seven sacraments, in favor of only three—baptism, the Lord's supper, and penance. He contended for the use of the cup to the laity. His rapid writings—no fewer than three—in the same year, which he closed by burning the papal bull (1520), circulated in thousands, and were eagerly read. Nearly all Germany was aflame with the new spirit, and it seemed as if the empire would be wholly lost to the papacy.

The interposition of Charles V. produced at this crisis a temporary interruption in the progress of the reformation. Charles was crowned emperor of Germany in Jan., 1521, and immediately summoned at Worms a diet of the sovereigns and states of the empire. The papal leaders exerted themselves to have Luther summarily condemned at the diet. They succeeded so far as to make the emperor issue an edict for the destruction of the reformer's writings; but the estates refused to publish it unless Luther was allowed an opportunity of meeting his adversaries, under safe-conduct, and answering before the diet to the charges preferred against him. Luther was accordingly summoned to meet the assembled authorities of Germany at Worms. He gladly and proudly embraced the summons. His journey thitherward was a kind of triumphal procession, so enthusiastically did the people, and even some of the priests, greet him along the route. He is said to have entered Worms chanting "Ein feste Burg ist unser Gott"—the *Marseillaise* of the reformation, as has been remarked. The same night, however, the intrepid monk was heard in an agony of prayer in his room, overwhelmed by the solemnity of his circumstances. On the afternoon of the following day he made his appearance before the diet, and confronted its assembled statesmen and princes—a scene grand and striking in its features, which has been often painted. He was urged to retract; but he was immovable. In a speech, first in German, and then in Latin, he expressed his determination to abide by what he had written, and called upon the emperor and the states to take into consideration the evil condition of the church, lest God should visit the empire and German nation with his judgments. A direct answer was demanded from him whether he would retract or not. "I neither can nor dare retract anything," he replied, "unless convinced by reason and Scripture; my conscience is captive to God's Word, and it is neither safe nor right to go against conscience. There I take my stand. I can do no otherwise. So help me, God. Amen."

It was evident that Luther was not to be intimidated. He remained some days in Worms; but neither persuasion nor threatening availed with him. He received orders to depart; and in the end of April he set out on his way home. As he left Eisenach a few days afterward, and was passing through a narrow defile near the fortress of Altenstein, he was seized by two armed horsemen with attendants, carried to the neighboring castle of the Wartburg, and there lodged in safety. This apparently violent seizure was the friendly act of his sovereign, Frederick of Saxony, to protect him from the destruction that his intrepid conduct was certain to have called down upon him had he remained at liberty. The ban of the empire had followed him, and temporary obscurity was his only safety.

The reformation suffered, however, from the absence of his guiding hand. Carlstadt and others, when left alone at Wittenberg, gave the rein to many excesses. Reform seemed likely to merge into license! The heart of Luther, after a year's residence in obscurity, was incontrollably stirred within him to be at his old post again, directing and controlling the spirit of innovation; and he returned to Wittenberg in March, 1522. The lawless movement, however, which had received impulse, was not to be restrained. It broke out in many quarters. Social oppression and misery added to the flames of fanaticism. The peasantry rose in arms, headed by the Anabaptist Münzer, and the horrors of a civil war raged throughout Germany. Luther exerted all his influence to stem the unhappy tide of affairs; exhorted the nobles on one hand, and the peasants on the other; and at no part of his career did he show a higher spirit and wisdom, although he has not always got the credit of this.

With his hands thus full of practical labor, he plunged at the same time into a violent controversy with Erasmus, which by no means reflected so much credit on him. Erasmus and he had hitherto, although in different ways, co-operated in the same cause; but they were men of such different spirit and temper, that a separation between them was inevitable. Luther had felt this for some time, but he was reluctant to come to an open breach. "Do not join your forces to our adversaries; publish no books against me, and I will publish none against you," he had said in a letter in 1524. On the publication, however, of Erasmus's treatise *De Libero Arbitrio*, Luther could no longer hold silence. He responded in the same year 1525, by his counter-treatise, *De Servo Arbitrio;* and the war of words waged hotly and vehemently between them. Luther was not only hearty but violent in denunciation; his indignation sunk into coarseness, while the audacity of his logic plunged him into unguarded and even unmoral paradoxes, which left him gravely open to the cold and telling sarcasms of his opponent. He was evidently himself little satisfied with the result, and even his warmest admirers cannot see much to admire in the spirit and zeal which he manifested on this occasion.

Hitherto the reformation had not received any legal establishment. Frederick of Saxony, while warmly protecting Luther and his followers, did not yet take any steps to displace Romanism by legal enactment, and set up in its stead a reformed church. This was now done, however, by Frederick's successor. He commissioned Luther and Melanchthon to prepare a new form of church government and church service for his dominions. His example was followed by the other princes and states in Germany that had renounced the papal supremacy. The reformation thus obtained substantive existence and civil support. It was no longer merely a spiritual movement, it became henceforth also a political power. This important result showed itself conspicuously at the diet of Spires in 1526. An endeavor made at this diet to suppress the new religious movement, and to insist upon the rigorous execution of the papal sentence against Luther and his followers, was successfully opposed by a majority of the princes and representatives of states; and it was resolved, on the contrary, that the princes should have full power to order ecclesiastical affairs in their own dominions as they thought proper. This resolution served greatly to extend the reformation. The emperor was too busy for some years with his own affairs to be able to interfere with the course of events; and the reforming cause was in the mean time greatly strengthened and advanced in various states of Germany.

This period of progress and tranquillity, however, was soon interrupted. A new diet was convoked at the same place in 1529; and under the more powerful influence of the papal party, backed by the presence of the emperor's brother, who presided in the diet, the measures of the former diet were recalled, and all changes in religion declared to be unlawful except such as might be authorized by an approaching general council. It was then that the elector of Saxony, the landgrave of Hesse, and other princes of the empire who had already embraced the reformation, and established it in their dominions, made a solemn *protest* against the action of this diet—a circumstance which gave rise to the name of *Protestants,* which has since attached to all the followers of the reformation. See PROTESTANT.

While the reformation thus ran its course in Germany, and was adopted by the civil authorities in many states, it was making corresponding progress in Switzerland, and there at length also, after a famous and elaborate conference held at Bern in 1528, under the countenance of the civil authorities, the supremacy of the pope was abolished, and the reformed doctrines, in even a broader and more definite shape than in Germany, were declared to be the only doctrine of Scripture. Bern, Zürich, and Basel continued to be the main centers of the reformed movement in Switzerland; but the reformed doctrines gradually extended throughout the great majority of the cantons. Chiefly those surrounding the lake of Lucerne remained, as they remain to this day, strongly attached to the Roman Catholic faith. The chief point of difference between the reformers in Switzerland and Germany concerned the doctrine of the eucharist. Luther, while abandoning the doctrine of a literal conversion of the bread of the eucharist into the body of Christ, known under the name transubstantiation, held to a modification of this doctrine, under the name of consubstantiation. The bread did not become the body of Christ literally, but it contained the body of Christ. Christ was in the bread as really "as the sword in the scabbard or the Holy Ghost in the dove." Zwingli, on the contrary, and his co-reformers in Switzerland, discarded all outward presence of Christ in the eucharist. The service, in their view, was merely memorial. "It is the spirit that quickeneth; the flesh profiteth nothing:" a passage which they applied to prove the worthlessness of any supposed eating of the body of Christ, even if such a thing were possible.

The dispute which arose on this subject between the reformers of Germany and Switzerland, and especially between their respective leaders, Luther and Zwingli, proved a serious impediment to the cause. Philip of Hesse sought to bring about a reconciliation between them. Zwingli, Bucer, and Oecolampadius met with Luther and Melanchthon at Marburg in the year 1529, on his invitation, and held a long conference, but without any result. Luther was not to be moved in a matter which he held to be of the very essence of the Christian faith. The combatants separated with their opinions unchanged.

When Charles V. perceived the firmness of the Protestant princes in the position which they had taken up, he became anxious for temperate and conciliatory measures. In an interview with the pope at Bologna he urged, but without success, the necessity of a general council, and at the same time took means to convene personally with the princes at a new diet to be held at Augsburg. In the view of this important convention the reformers prepared, at the instance of the elector of Saxony, a statement of their special doctrines. The basis of this, the famous *Confession of Augsburg*, was 17 articles, delivered by Luther to the elector at Torgau, which had been adopted at a conference at Schwabach in 1529. These articles, enlarged and polished by the careful and moderate pen of Melanchthon, were submitted in 28 chapters to the diet which met at Augsburg in June, 1530. Twenty-one chapters were occupied with the statement of the opinions of the reformers, and the remaining seven devoted to an exposure of the errors of popery. The reading of this confession by the chancellor of Saxony, in name of the Protestant states, made an earnest and favorable impression upon the diet. The papal authorities submitted a reply, which was approved by the emperor, and ordered by him to be accepted as a conclusion of the religious differences which had arisen. The Protestants responded instead by an answer to the papal document, which was afterward expanded by Melanchthon, and published under the title of *Apology for the Confession of Augsburg*.

The religious schism between the emperor and many of the states of Germany seemed now approaching a crisis which could only terminate in war. A renewed decree, exceeding in severity that of Worms, was launched against the reformers. They on their part appreciated the solemnity of the crisis, and met, headed by the elector of Saxony, first at Smalkald, and then at Frankfort, in the years 1530 and 1531, when they entered into a treaty of defensive alliance, and encouraged each other in the resolution to maintain their religion and liberties against the threatened encroachments of the imperial edict. To Henry VIII. of England, who was at that time just beginning his own erratic career of reformation, they sent a special invitation to co-operate with them, on the basis of the doctrines of the *Confession of Augsburg*, an invitation to which he responded, but which issued in no practical result. The emperor, notwithstanding the strongly hostile attitude which he had assumed, was not prepared as yet to plunge into hostilities. The Turks were menacing the frontier of the empire; he had his own personal objects to gain in the advancement of his brother Ferdinand to the dignity of king of the Romans, an object which he could not accomplish without a majority of votes at an imperial diet. He was content, therefore, to enter anew into negotiations with the Protestant princes, and after many unavailing projects of reconciliation, a treaty of peace was concluded between them at Nuremberg in 1532. The Protestants agreed to support him against the Turks, and to acknowledge Ferdinand as king of the Romans; while the emperor in his turn agreed to abrogate the edicts of Worms and Augsburg, and allow the Protestants the free exercise of their religion until some settlement by a general council or a diet of the empire.

It was the emperor's necessities, and not his will, which consented to the peace of Nuremberg; there was no prospect, therefore, of its being lasting. But the Protestants availed themselves of their temporary repose to strengthen themselves and extend their power. The emperor continued to urge the pope to convoke a general council. At length, in 1536, Paul III. issued a summons for a council to meet at Mantua in the following year; but the duke of Mantua being disinclined to receive so many turbulent guests into his quiet city, the project did not take effect. In anticipation, however, and convinced that no council convened under the exclusive influence of the pope would deal fairly with the subject in dispute, the Protestants met at Smalkald in the year 1537, and while solemnly protesting against a mere Italian or papal council, at the same time agreed to a new summary of their doctrines, drawn up by Luther, to be presented to the assembled bishops. This summary is known under the name of the *Smalkald Articles*, and along with the *Confession of Augsburg* and the *Apology for the Confession*, constitutes to this day the doctrinal basis of the German Lutheran Church.

At length, in 1546, the same year in which Luther, worn out by his many toils, died somewhat suddenly at Eisleben, a council assembled at Trent. It was soon evident that no compromise was practicable between the Protestant and the papal party, and both sides prepared to try the venture of war. When the council of Trent promulgated its decrees, and the reformed princes in the diet of Ratisbon protested against their authority, the emperor raised an army to compel their obedience. They, on their part, were ready with their forces, and marched into Bavaria against the emperor. The results, in the first instance, were severely disastrous to the Protestant cause, chiefly through the division of the princes, and especially the perfidy of Maurice, the nephew of the elector of Saxony. Various attempts at reconciliation and compromise were again attempted, in which Melanchthon took a prominent part; but, as before, they came to nothing. A change of fortune gave a temporary triumph to the Protestant arms, and the result was that Charles concluded a formal treaty at Passau, in 1552, which may be considered the foundation of the Protestant liberties of Germany. The Protestants stipulated for the free exercise of their religion, until the meeting of a diet which should settle a permanent religious peace; and in return they agreed to lend assistance against the Turks, who were still menacing the frontiers of the empire. The promised diet assembled at Augsburg in 1555, and framed articles for the religious pacification of Germany, according to which all adherents of the Augsburg confession of faith were left in the undisturbed enjoyment of the rights which they had acquired, were freed from papal domination, and allowed to order their religious concerns as seemed best to them; Protestants and Catholics alike being bound to respect each others' convictions, and not to injure or persecute one another on account of religion, under penalty of being proceeded against as enemies of the empire. This treaty of Augsburg terminates the period of the reformation in Germany.

In the neighboring countries of Denmark and Sweden, the progress of reformed opinions had proceeded still more rapidly than in Germany. In both these countries, the sovereigns took the lead in enlightening their people, and freeing them from the tyranny of the church of Rome. In Sweden particularly, Gustavus Vasa showed both great courage and prudence in carrying out a reforming policy. He invited learned Lutheran teachers into his dominions, and showed special zeal in the circulation of a Swedish version of the Scriptures, made by one of these teachers, named Olaus Petri, who occupies the most prominent place among the Swedish reformers. At an assembly of the states at Westeraas, in 1527, while there formers in Germany were still struggling for bare existence, it was unanimously resolved that the Lutheran doctrines should be adopted in Sweden, and a Reformed church, entirely independent of Rome, established. The same result occurred in Denmark in 1539, when an assembly of the Danish states at Odensee gave formal sanction to a plan of religious doctrine, worship, and discipline, drawn up by Bugenhagen, a disciple and friend of Luther, whom Christian III. had invited from Wittenberg for the purpose.

In France the progress of the reformation was of a much more uncertain and wavering character. As early as 1523 the new doctrines had spread greatly in many parts of France, under the countenance of Margaret, queen of Navarre, sister of Francis I., the constant rival of Charles V. The names chiefly associated with this early phase of the French reformation, besides that of Margaret herself, are those of Lefevre and Farel, the latter particularly a man of active and fiery zeal, who had been originally a priest in Dauphiné, and whom we find subsequently associated with Calvin in Geneva. The university of Paris became for a time strongly infected with the "new learning," and many of the nobility, as well as the people, were actually inclined to throw aside the superstitions of Rome, and embrace a more scriptural form of faith. But the violent and inconsistent policy of Francis I., and the fierce spirit of faction which the struggle engendered, gave an unhappy turn to the course of events in France, and prevented the reformation from obtaining in that country anything of the same national recognition that it obtained in Germany and elsewhere. Both Farel and Calvin were driven by the violence of persecution into Switzerland. The latter settled for a time at Basel, where he completed and published the first edition of his *Institutes*. The famous preface, addressed to Francis I., bears the date of Basel, Aug. 1, 1535. In the following year he repaired to Geneva, where Farel, already laboring in the work of the reformation, retained him by a "divine menace," and he began that great career as a reformer, theologian, and legislator which has rendered his name so illustrious.

In Spain and in Italy the spread of the reformation, which in both countries had taken an active and hopeful start, was almost entirely suppressed by the power of the inquisition. The church of Rome was able to bring its whole force to bear upon these countries, unchecked by political hostility. The flames of martyrdom, which elsewhere seemed to kindle a double zeal for the cause which they aimed to destroy, were here kept burning with such an incessant and devouring cruelty, as to consume all life out of the new movement, and brand the name of Protestant with the infamy which, in the popular mind, always attaches itself to hopeless failure.

The same policy was attempted in the Netherlands. Upwards of 100,000 of the inhabitants are said to have fallen under the atrocious cruelty of Charles V. and his son, Philip II. But the spirit of political freedom and moral earnestness proved at length an equal and finally, through a protracted and bloody conflict, a victorious match for the blood-thirstiness even of Philip and Alva: and the principles of the reformation, after a Calvinistic type, were at length established in the United Provinces, along with the political supremacy of the house of Orange.

The reformation in England is marked by peculiar features—an under-current of popular movement, dating even from the time of Wycliffe, and a somewhat inconsistent and wavering series of political changes during the reigns of the three Tudor princes, Henry VIII., Edward VI., and Elizabeth. In the beginning of the 16th c., as early as the first movements of Luther, there are indications of a revival of evangelical religious life among the tradesmen of London, and the peasantry in different parts of the country, particularly in Lincolnshire. The popular mind had begun to look with suspicion and ridicule upon some of the most characteristic doctrines of Romanism. A story is told by Foxe of a Lincolnshire peasant, busy thrashing his corn in his barn, accosted by a neighbor. "Good-morrow, you are hard at work." "Yes," replied the man, in allusion to the doctrine of transubstantiation, "I am thrashing God Almighty out of the straw." The residence of Erasmus in England, in the beginning of the reign of Henry VIII., stimulated a spirit of biblical inquiry among the educated classes, which, while it remained for the most part faithful to the church of Rome, as in the case of More and others, yet helped to advance a reforming movement. The study of his Greek Testament was eagerly entered upon by a few students at both universities, especially at Cambridge. We find Biling, Tyndale, and Frith associated at the latter place in 1520; and in the decade following, Cranmer, Ridley, and Latimer all come into prominent notice. It is at the end of this latter period—the year 1529—a year before the meeting of the diet of Augsburg in Germany, that the reformation in England may be said to take its first decided advance. In this year the usurpations of the clergy, and the manifold ecclesiastical abuses prevailing in the country, were the subject of parliamentary legislation. The negotiations as to Henry's divorce from Catharine had been proceeding for some time, and the country was greatly excited by the course of events. In 1533 Henry was married to Anne Boleyn, and his former marriage with Catharine declared void. All appeals to Rome were forbidden. In the two following years the sovereign was declared to be the supreme head of the church of England, with authority to redress all errors, heresies, and abuses in the church; the monasteries were dissolved; and parliament petitioned that a new translation of the Scriptures might be authorized and set up in churches. In all this course of reformation, however, there was but little religious impulse on Henry's part, for we find him again, in 1539, yielding violently to the spirit of reaction, and passing the famous statute known as the six articles, which rendered it penal to deny the doctrine of transubstantiation, or to affirm that priests might marry. Cranmer, who had been for some years archbishop of Canterbury, labored to prevent their passing; and Latimer resigned his bishopric as soon as they were confirmed.

With the accession of Edward VI., in 1547, the reformation greatly advanced. The statute of the six articles was repealed, with other reactionary measures of the close of Henry's reign. The parliament of 1548 established the use of the book of common prayer; the clergy were permitted to marry; the cup was allowed to the laity; and in 1551 the 42 articles of religious belief, afterward reduced to 39, were promulgated. The temporary restoration of popery under Mary, and the final establishment of Anglican Protestantism under Elizabeth, are well-known events, belonging to the special history of these reigns.

In Scotland the reforming impulses began with Patrick Hamilton about the same time that Cranmer and Latimer first appear active in England. Hamilton was educated in Paris and in Germany, and learned there the doctrines which he introduced into his native country. There was something, indeed, of the same popular movement, known under the name of Lollardism in Scotland, as in England, and Hamilton's preaching may have served to kindle up the dying embers of this movement. His early death, in 1528, undoubtedly produced a great effect. "Men began," says Knox, "very liberally to speak." "The reik of Mr. Patrick Hamilton infected as many as it did blow upon." After Hamilton, George Wishart appears as the next hero-martyr of the Scottish reformation; and in connection with him—as his reverend disciple and companion—we first hear of John Knox, who became finally the great leading spirit of the movement, by whose influence popery was extirpated, and the reformation established in Scotland in 1560. The Scottish reformation followed the type of the Calvinistic reformation in Geneva, where Knox had taken refuge during the period of persecution in Scotland, and acted for some years as the companion of Calvin. Episcopacy was abolished, and the fabric of the reformed kirk set up in every respect as far as possible in opposition to the papal system, which had become the opprobrium of the people.—*Ranke's History of the Reformation in Germany;* D'Aubigné's *History of the Reformation;* Waddington's *History of the Reformation.*

Such is the light in which this great religious revolution presents itself to the Protestant. Catholic students naturally regard it very differently; and although the name **Reformation** has come to be generally adopted as the historical designation of the religious movement of the 16th c., this name is only accepted by Catholics under protest, and as a conventional phrase, the rigorous meaning of which they distinctly repudiate. The more strict writers among Catholics employ in its stead the name "pseudo-reformation," or "so-called reformation."

As regards the event itself, Roman Catholics, while they admit that many abuses existed in the church which called for reform, and many superstitions existed which deformed the true character of religion among the ignorant masses of the people, contend nevertheless not only that the extent and the nature of these abuses and superstitions are greatly exaggerated, but also that the task of reforming them did not imply either the necessity or the lawfulness of a separation from the church. They assert that the conduct and character of many of those who were most prominently engaged in the movement prove them to have been influenced by corrupt and unworthy motives; that in their effort to throw off the obedience of Rome, they rather sought emancipation from moral and disciplinary restraint, than the purification of the religious system of the church; that the change in many of the countries in which it was effected was brought about mainly through the agency of the sovereign, with a view to the appropriation of the revenues of the church; and that in others it was brought about by appealing to the prejudices of excited and unreasoning multitudes, who were taught to confound the system with its abuses, and who were incapable of distinguishing the true doctrine of the church from the superstitions which were justly held up for reprobation. And thus in the view of Catholics, the true **Reformation** of the church was not that which has been described above, as carried out by the seceders of the 16th c., but that internal change which was effected by the decrees of the council of Trent, and by the religious revival which took place simultaneously with the sittings of that assembly. They dwell much on the fact, that all the notable successes of Protestantism were at its first origin, and that, in the words of lord Macaulay, if Protestantism had at its first onset "driven Catholicism to the Alps and Pyrenees," so Catholicism, in its turn, "rallied and drove back Protestantism even to the German ocean."

As to the moral and religious results of the reformation, the same difference of opinion exists. That the very necessity of action which it created had a beneficial influence on their own church, by the internal revival to which it led, Catholics freely admit; but they look upon the revolt against authority, the inauguration of religious innovation and skepticism, the separation from the church, and the disruption of Christian unity, as fraught with moral and intellectual evil; and a work of much learning has been devoted, by the well-known Catholic theologian, Dr. Döllinger (q.v.), to establishing this point by the confessions of the first reformers themselves, and their immediate successors. See *Die Reformation, ihre innere Entwicklung und ihre Wirkungen*, von J. Döllinger (3 vols. 8vo, Regensburg, 1848).

REFORMATORY SCHOOLS. The first institution to which queen Victoria gave her name was a reformatory for girls, established at Chiswick in 1834, under the name of the Victoria asylum. It was the first of its kind in England; but as early as 1788, the germ of the reformatory movement may be traced in the working of the Philanthropic society, which established a sort of farm-school, on the family system, for the reformation of depraved and vagrant children. A second school was established at Warwickshire in 1818, but was suffered to die for want of support, as was the third, set on foot by capt. Brenton in 1830. Capt. Brenton was the first who took his stand on the principle, that no child under 16 should be sent to prison, but to some place where training might be provided in industry and virtue; and the girls' school at Chiswick originated in his influence, and was worked on his plans. On his death in 1839, reformatory efforts ceased for several years in England—the institution of the Philanthropic society at St. George's in the fields being a mere refuge for the destitute. But its chaplain was the rev. Sydney Turner, since the well-known inspector of prisons and reformatories, and his attention was directed to the reformatory movement abroad, where its principles were flourishing in the school of Mettray (q.v.), founded in 1839, and the Rauhes Haus (q.v.) at Hamburg. In 1847 the St. George's institution restricted its care to boys charged with or convicted of crime; and at length, in 1850, broke up and removed to Redhill, establishing there, on the family system, the greatest reformatory in England. From this time the progress was rapid and sure. In 1852 several schools were opened: Hardwicke court by Mr. Baker; Kingswood, by Miss Carpenter; Stoke farm, by Mr. Joseph Sturge; and Saltley, near Birmingham, by Mr. Adderley. Government then determined to legalize the system. Three parliamentary committees having pronounced against the imprisonment of children, the reformatory schools act, 17 and 18 Vict., was passed in 1854, followed by amending acts in the three succeeding years. One of the first principles of the movement was voluntary agency, and this agency was still retained. The act sets out in its preamble, "that whereas reformatory schools have been, and may be established by voluntary agency in various parts of the country, it is expedient that more extensive use should be made of these institutions." The state certifies the school to be fit for its purpose; provides that, on conviction, after a short imprisonment, not more, generally, than 14 days, the child shall enter the school, and remain for a term of years, under the sole management of its conductors, paid for by the treasury at the fixed rate of 6s. per week. A portion of this is recoverable from the parents, if they are in a condition to contribute to the child's support. Counties and boroughs may furnish from their funds money to aid in the establishment of reformatory schools. The results of the schools have been regularly presented to the public in the reports of her majesty's inspector, who has often traced to their operation the late marked decline in juvenile delinquency, which was previously rapidly increasing. By the end of 1856, 34 schools were in existence; 11 were added in 1857; and in 1860, the number in Great Britain was 59. At the close of 1877 there were in England 54, and in Scotland 12 reformatories. The number of inmates (including those out on trial) was 6,665 in 1875, 6,614 in 1876, 6,853 in 1877 (being 5,935 actual inmates). The total amount of money expended in the year 1877 on these important institutions was £139,825. The average cost per head for food and clothing was: English boys' schools, food, £8 1s. 8d.; clothing, £2 9s. 5d.; English girl's schools, food, £7 12s. 10d.; clothing, £2 0s. 8d.: Scotch boys' schools, food, £7 9s. 2d.; clothing, £2 9s. 7d.; Scotch girls' schools, food, £6 12s. 10d.; clothing, £1 19s. The education commission said of these schools: "Upon the whole, none of the institutions connected with education appear to be in a more satisfactory condition." It has, however, been urged that children should not be sentenced to reformatories on a first conviction, as it was becoming the rule to do, and that all children under 12 should be sentenced to an industrial (q v.) school instead. See JUVENILE OFFENDERS.

REFORMED CHURCHES, a term employed in what may be called a conventional sense, not to designate all the churches of the reformation, but those in which the Calvinistic doctrines and still more the Calvinistic polity prevail, in contradistinction to the Lutheran (q v.). The influence of Calvin proved more powerful than that of Zwingli, which, however, no doubt considerably modified the views prevalent in many of these churches. The reformed churches are very generally known on the continent of Europe as the *Calvinistic churches*, while the name *Protestant church* is in some countries almost equivalent to that of *Lutheran*. One chief distinction of all the reformed churches is their doctrine of the sacrament of the Lord's supper, characterized by the utter rejection not only of transubstantiation, but of consubstantiation; and it was on this point, mainly, that the controversy between the Lutherans and the Reformed was long carried on. See LORD'S SUPPER and SACRAMENTARIAN CONTROVERSY. They are also unanimous in their rejection of the use of images, and of many ceremonies which the Lutherans have thought it proper to retain. Among the Reformed churches are those both of England and Scotland, notwithstanding the Episcopalian government of the former; the Protestant church of France, that of the Netherlands, many German churches, the Protestant churches of Hungary, Poland, etc., with those in America which have sprung from them.

REFORMED CHURCH IN AMERICA (DUTCH), formerly called "the Reformed Protestant Dutch church in North America," is a body of Christians in the United States composed primarily of descendants of settlers from Holland. They claim the honor of establishing the first Protestant church organization, the first day-school, and the first theological seminary, on this continent. The mother church began her existence in the Netherlands toward the end of the 15th c., the scattered congregations meeting in secret under the ban of the government and inquisi tion, and calling themselves "the Churches of the Netherlands under the Cross." Two earnest students of the Greek New Testament, both natives of Groningen, Gansevoort and Agricola, may be called the heralds of the reformation in Holland; which, as Motley says, "entered through the Huguenot gate." The "Belgic confession:" based on that of the Calvinistic churches of France, was published in 1561, and adopted by the synod of Antwerp in 1563, and at Wesel in 1568. The conflict with Philip II. was precipitated in 1566, and the long pent-up convictions of the people burst into flame. Open-air preaching and the singing of hymns in the vernacular fired the hearts of the masses. The scattered churches now formed themselves into one organization, adopting the designation of "a lily among thorns." During the heroic struggle for liberty, and amid fierce persecutions, the reformed faith became the religion of the state, the "union of the seven provinces" dating from 1579. In gratitude to William, prince of Orange, the Reformed church adopted his coat-of-arms as their distinctive blazon, adding to the original Dutch motto *Eendracht maakt macht* (unity makes strength), the text "*Nisi Dominus frustra.*" The national church of Holland now took its place among the churches of the continent, its faith being "protestant" as opposed to the pope's rule; and "reformed" as distinct from Lutheranism. The Reformed church of Holland, of s. Africa, and in the Dutch colonies throughout the world, is still flourishing, the most striking event in its history being the session of the synod of Dordrecht (or Dort), in 1619, to settle the controversy between the Calvinists and Arminians; and the translation of the states-general's version of the Bible, in 1637, at a cost of $100,000, which is still the standard Dutch version.

The Reformed church in America was organized in 1628, in what is now the lower part of New York city, by the rev. Jonas Michaelius. Hendricks Hudson sailed up the Hudson river in 1609; a trading-post was established by Hollanders on Manhattan island in 1614, and an agricultural settlement in New Netherlands in 1623. The colonists, although without a clergyman, enjoyed in 1626 public worship and the pastoral services of two *krank-besoeckers* (comforters of the sick) who were lay church officers and empowered to conduct services in the absence of a minister. In the summer of 1628, the rev. Jonas Michaelius arrived, and at once organized a church, with a consistory, there being fifty communicants present at the first celebration of the Lord's supper. This is now the Collegiate Reformed church in New York city. In 1633 the rev. Everardus Bogardus arrived to succeed Michaelius, and with him came the schoolmaster Adam Roelandsen, who founded the present flourishing Collegiate Church parochial school, now in its 249th year of successful operation. The wife of the "dominie" (or pastor) Bogardus was Annatje Jansen (Anneke Jans), whose farm, then lying in the suburbs of the settlement, has become the property of Trinity church. See BOGARDUS, EVERARDUS. At the time of the English conquest in 1664 there were seven reformed churches in the country. These were at New York, Albany, Kingston; Flatbush and Flatlands, on Long Island; Bergen, N. J., and New Amstel, Del.; the Hollanders numbering in all probably less than 10,000. These 50 years, from 1614 to 1664, form the first period of this church's history. The second period, marked by struggles with the English governors, who wished to impose the language and ecclesiastical customs and rules of England upon the Hollanders, lasted from 1664 to 1737. During this time the number of churches increased to sixty. Colonies of Huguenots from France, and many thousands of Germans from the Palatinate, arrived in America and connected themselves with the Reformed church; which, as the line of distinction between the English and Hollanders became more definite through their resistance of official interference, was called the "Reformed Protestant Dutch church." The first use of this name was in a charter given by William III to the church at New York. in 1694. The lines of the Dutch churches extended mainly along the Hudson, Mohawk. and Raritan valleys, and on Long and Staten islands. Emigration from Holland had almost wholly ceased. Most of the ministers, however, came from Holland, and the classis of Amsterdam in the old country was the superior judicatory. In 1737 the American Dutchmen formed a "Coetus" or ecclesiastical body in New York, which applied for permission to hold an annual synod for ecclesiastical business only, subject to the approval of the classis of Amsterdam. With proverbial Dutch slowness, the permission was granted after a delay of nine years. Even then, the measure of power granted was too small to render effective the operations of the yearly conference of lay and clerical delegates. In 1755, through the influence of the more progressive spirits, the first American classis was formed. This was the signal for sixteen years of bitter strife between the adherents of the *coetus* or progressives, and the *conferentie* or conservatives. The peace-maker who finally healed the long strife was the rev. John H. Livingston, a graduate of Yale college, who went to Utrecht for theological study. In 1771 he presented a plan of union to the churches assembled in convention at New York, which being accepted by the classis of Amsterdam and the American Dutch churches, the way was made clear for the present ecclesiastical organization.

In 1792 the constitution of the church, based on the articles of church government in Holland, was formed. About this time the German churches in New York, Pennsylvania, and the south, which had been under the care of the classis of Amsterdam, assumed the right of self-government, some of them remaining with the Dutch churches, others forming "The German Reformed church." See REFORMED CHURCH IN THE UNITED STATES. The statistics of the Reformed Dutch church at that time give 1 general synod, 5 classes, 130 churches, and 50 ministers. The English language was used in but few churches until long after the revolutionary war, which fact alone would explain why this oldest of the Presbyterial churches in America is among the smallest. The first preaching in English in 1764 by rev. A. Laidlie in New York caused a law-suit between parties in the church, and began a still longer strife. The young people in the cities were thus largely lost to the church, while emigration added nothing, until the years 1846 and 1847, and the years following, when a fresh influx of Hollanders to our shores greatly added to the strength of the Reformed church in Iowa, Michigan, and Wisconsin, leaving, however, a geographical break between the churches east and west, now but partly filled. The Holland tongue is still used in many of these latter churches.

The theological standards are identical with those of the Reformed church of Holland, viz.: The Belgic confession, the Heidelberg catechism, the canons of the synod of Dort; the prevailing type of doctrine being that of moderate Calvinism. In government, the church is strictly Presbyterian; in worship, semi-liturgical. The liturgy, the use of which is optional, and which is but partly used in most of the churches, was first adopted by the synod of Wesel in 1568, modified in 1619, and translated into English in 1767. It is part of the constitution of the church. The use of the forms for the administration of baptism and the Lord's supper, for ordination of ministers, elders, and deacons, for excommunication and readmission of excommunicated members, are obligatory upon every minister. Those for the litany and prayers, marriage and burial service, laying of corner-stones, for opening and closing of consistory, are optional, and, except in the case of the litany and prayers, largely in use. Formerly the clerk, who was also precentor (*voorlezer en voorzanger*), stood in the desk below the pulpit, read the commandments and creed, and gave out and led the singing of the psalms, the minister in gown and bands entering the pulpit during the first singing. At his side, on the pulpit, was an hour-glass, to measure the length of the discourse, which ought not to exceed one hour. English hymns were first sung in 1767. Four officers are recognized in the constitution: ministers of the word, teachers of theology, elders, deacons. The judicatories are the consistory, classis, particular synod, general synod. The consistory of each church is composed of minister, elders, and deacons; the elders being charged with spiritual functions, the deacons having care of the poor. Usually the consistory are sole trustees of the church property. The elders are elected not for life, but by the male communicants for two years; this rotation in office changing half of the consistory each year. The great consistory is an advisory body composed of all elders and deacons who have been in office. Elders and deacons, like ministers, are considered as bound to the sanctuary for life, though not always in office. The classis is composed of not less than three elders and three ministers from at least three churches, and holds meetings semi-annually. The classes preside over the churches, license, ordain, install, dismiss, suspend, and depose ministers, examine minutes of consistories, and try cases of appeal from the latter. The particular synod presides over the classes, forms new ones, transfers congregations from one to another, and decides cases of appeal from them. It meets once a year, and is composed of four elders and four ministers from each classis. The general synod supervises the whole church. It meets once a year in June. Three ministers and three elders from each classis form this body, which is the final court of appeal, which cannot, however, change the constitution. Such a change can come only by a majority of the classes. In 1880 there were 1 general and 4 particular synods, 33 classes, 510 churches, 545 ministers, 43,289 families, 80,208 communicants, 645 Sunday-schools having 80,445 scholars; $171,614 $\frac{47}{100}$ were raised for benevolent and $852,286 $\frac{88}{100}$ for congregational purposes.

The educational institutions are Rutgers college at New Brunswick, N. J., founded in 1770, well endowed and equipped; Hope college at Holland, Mich., chartered in 1866; and the theological seminary at New Brunswick, N. J., founded in 1784. Union college was founded and first endowed by the Dutch church at Schenectady, N.Y. The boards, which are under the control of general synod, have charge of foreign missions, home missions, education, and publication; with funds for widows and orphans, disabled ministers, and church building. In missionary work, preaching among the Indians was begun by Dominie Megapolensis at Albany, three years before John Eliot held his first service. The old records of the churches at Schenectady, Albany, and in New Jersey contained the names of hundreds of baptized Christian Indians who were members of those churches; and the translations of the Scriptures, Christian doctrine and ritual into the Indian languages, especially the Mohawk, still attest the missionary spirit of the early Dutch pastors and people in America, which was continued in, or directly by, the church among the Indians settled on reservations, until 1830. Missionary work in Asia was begun at first in co-operation with other societies. After contributions made during many years, the first band of missionaries was in 1836 sent out to India, and thence to Borneo. In 1858 independent denominational effort was inaugurated. The China mission was begun in 1844; the Arcot, India, in 1854; and the Japan in 1859; the names of Scudder, Abeel, Talmage, Van Dyck, Brown, Verbeck, being prominent in the annals of the Reformed missions. The statistics of the work for 1880 are: stations 14, out-stations 101, missionaries 16, assistants 21, native pastors 11, catechists, readers, helpers, etc., 133, churches 35, members 2,341, academies and schools 52, scholars 1741, native contributions $2,251. The appropriations of the board for 1880 were $74,279. The board of home missions, to whose fostering care half the churches of the denomination owe their existence, began work in 1849, and has had a large field of enterprise among the Hollanders and other people of the west. It disbursed in 1880 $34,527. The board of education assists indigent young men preparing for the ministry, and aids parochial schools under its care. In 1880 it expended $20,594, and aided 72 students, the allowance to each being $150 per annum. The expenditures of the other boards and funds for 1880 were: publications, $21,010; church building, $7,139; widows and disabled ministers, $6,098. The Reformed church corresponds by delegate or letter with a number of evangelical Christian bodies in the United States, Europe, and south Africa. The *Christian Intelligencer*, weekly, and *The Sower and Mission Monthly*, are denominational periodicals published in New York. See the *Manual of the Reformed Church in America*—a nearly complete biography of the ministers, with bibliography, and history of the church (3 vol. ed., 1879); *Manual of Missions*, (1877); *Constitution and Digest of Acts of General Synod; The Dutch Reformation; Centennial Discourses*, (1876); *History and Characteristics of the Reformed Dutch Church*—all published in New York; also, *Documentary History;* and Brodhead's History, New York; *Two Hundred Years of Church Life* (Schenectady, 1880); and *Quarter-millennial Anniversary of the Reformed Protestant Dutch Church of the City of New York* (1878).

REFORMED CHURCH IN THE UNITED STATES (GERMAN) was founded by emigrants from those provinces of Germany in which the Reformed church prevailed. Driven by persecution at home and encouraged by William Penn's offered gift of land, a large number of them settled in Pennsylvania in the early part of the 18th century. Their first minister was rev. George M. Weiss, who, with 400 members, settled in Montgomery co., where a congregation was organized and a church built—the first of the denomination in America. Every year the number of emigrants increased, not only from Germany, but also from other states of Europe. Some of them settled in New York, New Jersey, Maryland, Virginia, and Carolina; but the larger portion went to Pennsylvania, east of the Susquehanna. They were destitute of ministers, organized churches, and teachers, and, in a great degree, of books. Poor at first, they were industrious, prudent, and moral, so that their temporal and social condition gradually improved. The formative period of the church began in 1746, when rev. Michael Schlatter, a Reformed minister from St. Gael, Switzerland, was sent to labor in America. He visited nearly all the German settlements, preaching, organizing churches, settling pastors, and establishing schools. In 1747 he organized the first synod. He then visited Europe to solicit aid, and having traveled through Holland, Switzerland, Germany, and

England, obtained a large fund, the interest of which was devoted to the support of ministers and teachers in America, and to purchase Bibles for distribution among the people. He also persuaded some young ministers to emigrate to America, five of whom went back with him. The church retained a position subordinate to the church of Holland for 46 years, during which time emigration increased, but the spiritual destitution continued. For 150 churches, there were not more than 22 ordained ministers. In 1793 the synod assumed the right to govern itself, and to have the sole care of their churches in America. The succeeding period of 30 years is not easy to describe. The people increased in numbers and wealth. Congregations multiplied. Many Germans went westward, and churches were planted in Ohio. The ministers also increased in number, from 22 to 82. But the standard of education among them was lowered. Instead of graduates from the universities of Europe, a majority of the young ministers were from the American church, and of imperfect education. And with the want of learning there came also an ignorance of its value. Ecclesiastical disorder also followed; laymen sometimes administered the sacraments, and some ministers were disposed, as individuals, to ordain men on their own judgment. The influence of rationalism in Germany and of deism in England was disastrous. But the reaction in Germany extended also to this country, and the revival of faith increased in power. After a struggle of seven years, the theological seminary was commenced at Carlisle in 1825; was removed to York, 1829; to Mercersburg, 1835; and continued there until removed to Lancaster, 1871. The establishment of this seminary and of Marshall college in connection with it, marks a new epoch in the progress of the church. The standard of ministerial qualification was raised, the number of students enlarged, and a spirit of philosophic thought evoked which has produced a distinct and much-controverted movement in theology and church life. See MERCERSBURG THEOLOGY. The education thus provided supplied the means for introducing worship and preaching in the English language; and from 1825 to the present time, amid much opposition, that change has been progressing. In 1879 a declaration of faith was prepared, designed as a settlement of differences in the church, and setting forth the Heidelberg catechism, in its historical sense, as the standard of doctrine. In that year, according to official reports, the church contained 6 synods, 45 classes, 714 ministers, 1374 congregations, 151,761 communicants, and 91,637 members not confirmed. The amount of contributions reported was $586,481.

REFORMED EPISCOPAL CHURCH, organized in New York city, Dec. 2, 1873, with 8 clergymen and 20 laymen, all of whom had been or were at the time ministers and laymen in the Protestant Episcopal church identified with the "evangelical" or "low church" party. One of them, George David Cummins, D.D., had been assistant bishop of the diocese of Kentucky until Nov. 10, 1873, when by letter to the presiding bishop he resigned his office and withdrew from the denomination. He became the bishop of the new organization: the rev. Charles Edward Cheney of Chicago was also elected bishop, and consecrated on a subsequent day. The following statement, condensed from the declaration of principles adopted at the organization, explains in the briefest form possible the doctrines held and the reasons assigned for adding a new denomination to the many already existing: I. The Reformed Episcopal church declares its belief in the holy scriptures of the Old and New Testaments as the word of God and the sole rule of faith and practice; in the apostles' creed; in the divine institution of the sacraments of baptism and the Lord's supper; and in the doctrines of grace substantially as they are set forth in the 39 articles of religion. II. It recognizes and adheres to episcopacy, not as of divine right, but as a very ancient and desirable form of church polity. III. Retaining a liturgy, not imperative or repressive of freedom in prayer, it accepts the book of common prayer as it was revised, proposed, and recommended for use by the general convention of the Protestant Episcopal church 1785: reserving the right to make alterations in it, provided that the substance of faith be kept entire. IV. It condemns and rejects the following doctrines as contrary to the word of God: 1. That the church of Christ exists only in one form of ecclesiastical polity. 2. That Christian ministers are "priests" in another sense than that in which all believers "are a royal priesthood." 3. That the Lord's table is an altar on which an oblation of the body and blood of Christ is offered anew to the Father. 4. That the presence of Christ in the Lord's supper is a presence in the elements of bread and wine. 5. That regeneration is inseparably connected with baptism.

The foundations of the University of the West have been laid at Chicago, near which a landed estate of great prospective value has been given to this church by Edward Martin of New York. At present only the Martin college of theology is in operation. At the seventh general council, Chicago, 1879, there were reported as belonging to the denomination: 6 bishops; 70 presbyters; 24 deacons; 70 parishes; 5,800 communicants, of whom 400 were added by confirmation, and 900 were otherwise received; nearly 800 Sunday-school teachers and 8,000 scholars; contributions for church and benevolent work, $128.000.

REFORMED PRESBYTERIANS (CAMERONIANS, *ante*) were found in Pennsylvannia 1743, at which time they met at Middle Octorara, and renewed their subscription to the old Scottish "covenant." In 1752 the rev. John Cuthbertson, sent over by the church of Scotland, became their minister, and in 1774, in connection with the rev.

Messrs. Linn and Dobbin from the Reformed presbytery of Ireland, constituted the Reformed presbytery of this country. In 1782 these ministers and a part of their people united with the Associate church in forming the Associate Reformed church. In 1798 they organized a presbytery at Philadelphia, which, having in 1800 the question of slavery forced on its consideration, declared that no slaveholder should be allowed to remain in communion with it. In 1807 it opened a theological seminary at Philadelphia; and in 1809 resolved itself into a synod containing three presbyteries. Holding that the church and the state are the two leading departments of Christ's visible kingdom on earth, they will not take a civil oath nor do any other act which implies full allegiance to the state. After the war of 1812 this peculiarity occasioned much debate among themselves, and led in 1833 to the formation of an independent synod by the more liberal-minded minority. The majority, made more homogeneous by the secession, now enforced their principles more rigidly. They neither become nor act as American citizens; do not vote at political elections, or enlist in the army, or accept civil stations, or serve as jurors, or in any way personally recognize the political system of the United States. Their theological seminary, organized in 1840, is established at Allegheny City, Penn., and has a faculty of three professors. The synod has several missions in foreign lands, one of which is at Latakiyeh, Syria. In 1877 the reported missionary and other benevolent contributions amounted to $45,000. The minority at the separation in 1833 is officially styled the general synod of the Reformed Presbyterian church, but is popularly called the New Light Covenanting church. Maintaining strictly the other principles of Covenanters, its members recognize their duties and embrace their privileges as citizens. Within a few years it has been weakened by the withdrawal of a part of its ministers and churches. The old theological seminary in Philadelphia is in connection with this portion of the denomination.

REFORMED PRESBYTERIANS. See CAMERONIANS.

REFRACTION. See DIOPTRICS; HEAT; REFRACTION, DOUBLE; UNDULATORY THEORY. In the articles referred to, the ordinary experimental laws of single and double refraction are stated; geometrical consequences, such as the mode of action of lenses, prisms, telescopes, and microscopes, are deduced from them; and the connection of these laws with the hypothesis of undulations is explained.

It remains that we should give the refractive and dispersive powers of a few common substances, to show the great diversity which exists among them, especially in the non-proportionality of dispersion to refraction. The following results are due to Fraunhofer, who was the first to employ, for this purpose, Wollaston's discovery of the *fixed lines* in the spectrum (q.v.), without whose aid all such observations are of comparatively little value. The lines B, D, and H, which we have selected for the table, correspond to definite rays of red, orange, and violet respectively:

Substance.	Refractive Index.			Dispersion.
	B.	D.	H.	(H—B).
Flint Glass	1.6277	1.6350	1.6710	0,0433
Crown Glass	1.5258	1.5296	1.5466	0.0207
Water	1.3310	1.3336	1.3442	0.0132
Turpentine	1.4705	1.4744	1.4939	0.0234

The numbers in the last column roughly show how far the red and violet are separated by prisms (of a given angle) of the various substances; and even this brief list shows how erroneous was Newton's idea that dispersion is proportional to refraction, an idea which led him to the conclusion that an achromatic (q.v.) combination was impossible.

Thus we see that the refractive indices of flint and crown glass are (approximately) as 16: 15, while the dispersive power of flint is more than double that of crown. Hence, if we construct prisms of the two materials, such that the angular separation of red and violet, which they produce, shall be equal, the angle of the flint will be far less than that of the crown, and the whole refraction also less. The combination of two such prisms, with their edges turned opposite ways, will thus bend (or refract) a ray of white light without separating the red from the violet—and thus we may obtain *refraction without color.*

This is not strictly the case, on account of what is called *irrationality of dispersion,* the existence of which is easily seen from the above table. Thus if we form two spectra, by means of properly constructed prisms, of different media, such that the lines B and H coincide, the lines D will not generally coincide. In other words, some substances draw out the red end of the spectrum more than the violet—and *vice versâ.* Thus, from the above table:

	D—B.	H—D.
Flint Glass	0.0073	0.0360
Crown Glass	0.0038	0.0170

But 73: 360:: 38: 187; hence we see that the distance from B to D in flint bears a less proportion to that from D to H than it does in crown. Thus, if, by proper arrangements, as before mentioned, B and H be made to coincide, D will be nearer the middle of the crown spectrum than of the flint. Hence, a double achromatic lens, composed of flint and crown, may be made to refract equally any *two* colors of the spectrum; but

there will be a slight non-accordance of the remaining colors. *Three* colors may be made coincident by using a *triple* lens, but this is now rarely constructed.

REFRACTION, CONICAL. In certain cases, light, passing as a single ray through a plate of a crystallized body, emerges as a hollow *cone* of rays; and in others, a single ray, falling on the plate, becomes a cone inside the crystal, and emerges as a hollow cylinder. These extraordinary appearances were *predicted* from theory by sir W. R. Hamilton (q.v.), and experimentally realized by Lloyd. They form one of the strongest arguments in favor of the truth of the undulatory theory of light. In our article on that subject we shall briefly describe them in connection with the theory of double refraction in biaxial crystals.

REFRACTION, DOUBLE. The great majority of crystallized bodies—and in general, all transparent bodies (such as glass)—when unequally strained, as by pressure, heat, or rapid cooling, divide a single ray which falls on their surface into two. Through a plate of such a substance every object appears doubled. The cause of this singular phenomenon cannot be explained without reference to polarization (q. v.), and it is therefore deferred to the article on the UNDULATORY THEORY OF LIGHT, where the principal experimental facts will be given, along with their theoretical explanation.

REFRAIN (Fr.), otherwise called the *burden* of a song, a part of a song which is repeated at the close of every stanza.

REFRIG'ERANTS. This term is applied in medicine both to internal and external cooling remedies. The medicines of this class prescribed for internal use cause a refreshing feeling and a sensation of coolness throughout the system, although they do not in reality diminish the temperature of the body. Their principal use is in the treatment of febrile and inflammatory affections, in which the benefit they produce appears to depend on the fact, that their direct action on the coats of the stomach occasions, by nervous sympathy, a temporary reduction in the force of the circulation. They likewise have the power of allaying gastric irritability and the morbid sensations of heat and thirst. The following are the refrigerants in most common use for internal administration: citric and tartaric acids taken into combination with bicarbonate of potash as effervescing draughts, ripe oranges, lemons (in the form of lemonade q.v.), chlorate of potash (ten grains dissolved in water, and sweetened with syrup, to be taken every second hour), and nitrate of potash, which may be taken in the same manner as the chlorate, or as *niter-whey*, which is prepared by boiling two drams of niter in a pint of new milk; the strained milk may be given in frequent doses of two or three ounces. Many continental physicians regard oxalic acid in the form of lemonade as the best of all the refrigerants. Its poisonous character must not be forgotten, but five grains dissolved in half a pint (or more) of water may be taken in divided doses in the twenty-four hours with perfect safety.

The following remarks on the external application of refrigerants are for the most part condensed from Mr. Simon's able article on "Inflammation" in Holmes's *System of Surgery*. Cold, continuously applied, is the sedative of every vital manifestation; and in theory, it may be regarded as being in direct and essential opposition to the causes of inflammation; and as it is thus an antidote to the causes of inflammation, rather than a remedy for the resulting changes, so, in order to get full advantage from its use, it should be employed from the moment when these causes begin to operate. Cold is of great value in the treatment of wounds, especially such as are made in surgical operations. The local temperature can be thus continuously moderated, care being taken that it is not too much reduced, so as to occasion gangrene. Under the effective use of cold (together, of course, with absolute rest of the parts), many a knee-joint, whether wounded accidentally or by a surgical operation, recovers without permanent injury. In most cases local cooling is best effected by water of the desired temperature. Cloths wetted with it are spread over the surface which is to be acted on, their original low temperature being retained either by their being continuously dripped upon by means of a bundle of threads inserted in a reservoir of cold water, and acting like a siphon, or by their being frequently re-wetted or changed. Their surface should be exposed as freely as possible to the air, so as to secure ample space for evaporation. In cases where great cold is required—as, for example, in cases of strangulated hernia, of inflammation of the brain and its membranes, or of fever with well-marked cerebral symptoms—bladders of pounded ice are preferable to wetted cloths. Both as regards the degree of cold and the period of its application, the surgeon should to a considerable degree be influenced by the sensations of his patient. When its application gives comfort, it is almost certain to be doing good; and in most cases where it gives discomfort, it is doing harm.

A notice of the external use of refrigerants would be imperfect without a reference to the memoir of Dr. Esmarch, professor of surgery in the university of Kiel, *On the Use of Cold in Surgery*, translated by Dr. Montgomery for "the new Sydenham society," in the year 1861. His mode of application is by means of India-rubber bags filled with ice, snow, or some freezing mixture; or of thin iron-plate reservoirs of cold water, made by means of a mold of gutta-percha to fit any inflamed part. In a case of "chronic purulent inflammation of the knee-joint," the ice-bags were continuously applied for 12 weeks. Dr. James Arnott's investigations on "Local Anæsthesia by Cold," in the *Medical Times* for the years 1854–5–7, and Dr. Chapman's method of treating nervous diseases by the application of cold to the spine, as recorded in his *Functional Diseases of Women* and elsewhere, require also a passing reference.

The application of cold, either through the medium of air or water, to the body generally is a subject of great importance. The use of cold air is especially seen in febrile cases, in which the physician directs the sick-room to be kept cool, and the patient (unless in exceptional cases) lightly clothed. Mr. Paget reports that the most successful cases of pyemia that have fallen under his observation were those in which the patients were freely exposed to the air. The value of baths and cold effusions is noticed in the articles BATH and HYDROPATHY. In addition to what is there stated, it is important to know that prolonged immersion in water as warm as 95° Fahr. may be the means of reducing febrile temperature.

REFRIGERATING MACHINES. Under the head ICE, some notice is given of machines by which it can be prepared artificially; but as the practical importance of refrigerating apparatus is daily increasing, we propose to give here a fuller sketch of one or two kinds. The ice making machine of Carré & Co. of Paris being one of the simplest and best of those which produce cold by the evaporation of some volatile liquid, we shall describe it first. It is shown in figs. 1 and 2, and consists of two strong cast-iron cylinders A and B, connected together by a metal tube T, all perfectly gas-tight. The whole apparatus is made strong enough to stand seven or eight atmospheres of internal pressure.

The cylinder A is charged with an aqueous solution of ammoniacal gas. Ammonia is a powerful absorber of heat, and is, moreover, so extremely soluble in water that the latter takes up nearly seven hundred times its volume of the gas. Air is completely expelled from the apparatus by opening a screw valve and heating the cylinder. It is then ready for use. On applying heat to the cylinder A, which fits into a small stove for the purpose, the solution of ammonia is volatilized, and carried over and condensed in the cylinder B, which is placed in a vessel containing cold water. The heat reaches to about 220° Fahr., and while it is being applied, the volatilized ammonia condenses into a liquid under very high pressure, produced by its own atmosphere, in the cold cylinder B. When the heating has gone on long enough—about half an hour for a small machine—the hot cylinder A is removed from the fire, and placed in a vessel of cold water, as shown in fig. 1. The cooling of this cylinder immediately causes the reabsorption, by the removal of the pressure, of the condensed ammonia from the other cylinder B; and as it passes again from the liquid to the gaseous state, intense cold is produced (see HEAT), and, in consequence, heat abstracted from everything in contact with this portion of the apparatus.

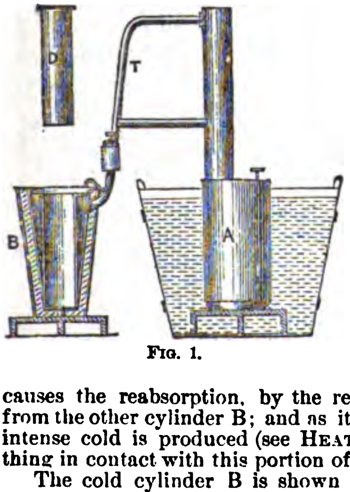

FIG. 1.

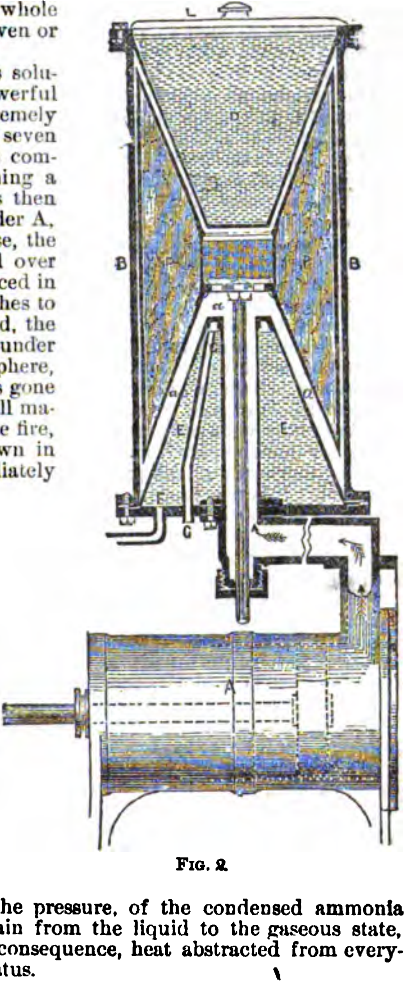

FIG. 2.

The cold cylinder B is shown in section in fig. 1. It is so constructed that the ammonia is contained in an outer jacket, leaving a hollow space in the center. When ice is to be made the latter is filled with salt water or other liquid which does not freeze at 32° Fahr., and into this is placed a loosely fitting metal cylinder D, containing the water to be frozen. In this way, with a small machine for domestic purposes, a few pounds of ice can be made in an hour or two; but large machines, on the same principle, are made which produce 440 lbs. of ice per hour.

There is a well-known refrigerating machine by Mr. D. Siebe of London, in which ether is used as the volatile fluid, its evaporation being produced not by heat, but by the action of an air-pump; the necessary cold is produced in the surrounding brine as the ether passes into vapor.

M. Pictet of Geneva has invented an ice-machine which works with anhydrous sulphurous acid instead of ether; but otherwise his process somewhat resembles Siebe's. It is now at work at an ice-making company's works in King's road, Chelsea. Some machines are also in use which produce ice by means of freezing mixtures; but they are of minor importance.

Mr. A. C. Kirk, late of the Bathgate chemical works, undertook, a few years ago, a series of experiments with a view to the construction of such an apparatus which would produce cold by the simple expansion and compression of air. He ultimately succeeded in producing an ingenious machine, which he patented April 25, 1862, the number of the specification being 1218.

Although it is not strictly true that the mere rarefaction of air produces cold, yet it will simplify the explanation of this machine to assume in the mean time that it does so. Its simplest form is shown in fig. 2, and consists of a cylinder with a piston to compress air, communicating with another cylinder containing a kind of piston or plunger where the compressed air is cooled and expanded. The machine is driven by a steam-engine, and it may be as well to remark, that the actual relative position of the cylinders is different from that shown in the diagram, which is given rather to show the principle of the apparatus than as an accurate representation of it.

The compressed air is forced by the compressing cylinder A into the refrigerating cylinder BB, just at the moment when the position of the plunger, PP, is close upon the upper cone D. This air, which fills the space *aa* between the plunger, PP, and the lower cone E, is of course heated by the compression; and in order to cool it again, cold water is made to circulate in the cone E, by an entrance-pipe F, and an exit-pipe at G. The next movement of the machine draws the piston in the cylinder A to the opposite end, and consequently allows the compressed air to expand again; but at the same moment the plunger, PP, descends close upon the cone E, thus allowing the space between the plunger and the upper cone D to be at its fullest when the expansion of the inclosed air is at its greatest.

By this arrangement, the patentee secures that the air while being compressed will always be at the lower, or what he calls the hot end, of the refrigerating cylinder B; and while being expanded, it will always be at the upper or cold end. There is a regenerator constructed as in the caloric engine (q.v.) of wire-gauze, placed in the middle of the plunger at C. This, while it allows the air to move freely through it, prevents the conveyance of heat or cold from one end of the cylinder to the other. The plunger, PP, is filled internally with sawdust or some non-conducting material.

We may now explain that the low temperature of the air which surrounds the cone D during expansion is not produced by simple rarefaction. That alone would not produce cold. It is necessary as well to abstract heat from the air by giving it some work to do, and here it unavoidably does work, in assisting to force back the piston of the compressing cylinder, while in the act of expanding. The air loses an equivalent of heat exactly in proportion to the amount of force which it expends in moving, or in assisting to move, the piston. See FORCE.

Before air is admitted into the cylinders, it is necessary to dry it thoroughly, by first passing it through a box containing chloride of calcium, because, if any moisture were present, it would freeze in the regenerator, and stop the action of the machine. In the particular form of the apparatus shown in the figure, the substance to be cooled is placed inside the cone D, which is furnished with a lid L. Here not only water, but even mercury, can be frozen with facility.

Most of the machines of this kind which have as yet been made were required for working on a more extensive scale than the one shown in fig. 2 could easily do. In the larger-sized machines, accordingly, instead of one hollow cone like D (fig. 2), a series of circular V-shaped corrugations are fixed to the top cover of the refrigerating cylinder. These form annular passages through which a continuous current of some fluid not easily frozen, such as brine, flows. This is of course cooled by the expanded air (in the manner already explained) at the cold end of the cylinder, and can be conveyed away in pipes to cool any substance at a greater or less distance from the machine.

After a trial of more than 10 years, the use of Mr. Kirk's machine has, in several large chemical works at least, been given up in favor of those machines which, like Siebe's, evaporate ether or some other very volatile liquid by mechanical power. Here, as in most other applications of it, the use of compressed air has as yet proved too costly. In some recent trials, an ether-machine required only 5 cwt., while Kirk's consumed 20 cwt. of coal to make a ton of ice. However, notwithstanding the difficulties attending the economical employment of compressed air for this purpose, as shown by the imperfect success of both Kirk's and Windhausen's refrigerators, Messrs. Bell & Coleman of Glasgow have quite recently introduced another compressed-air machine, which in 1879 was on its trial on board one or two large steamers engaged in bringing fresh meat from America to England.

The ether-machine of Siddeley & Mackay of Liverpool, which is an improvement on Siebe's, is now a good deal used for making ice, and for other purposes. In it a steam-engine is employed to work two vacuum-pumps, and to supply motive-power to other parts of the apparatus. The refrigerating vessels contain thin pipes, through which brine or chloride of calcium flows. Ether surrounds these pipes; and under the reduced pressure produced by the vacuum-pumps, with which the refrigerators communicate, a portion of the ether evaporates, producing cold in the act of doing so, as already explained. The ether vapor is then condensed at a slight pressure, cooled by a stream of cold water, and returned to the refrigerator. Some paraffine oil makers who use this machine have found that a very light shale naphtha answers as well as ether for their purpose.

Having already described Carré's small portable ammonia-machine, we may add here that this kind of ice-machine, even in its larger and more complicated continuous form, since it works by heat and has few moving parts, is really the simplest of all. Reece's ammonia-machine is more recent than Carré's, and is worked with anhydrous ammonia, instead of an aqueous solution of it. In Reece's process less fuel is required to distill the ammonia, less water to condense it, and less power to work the moving parts of the machine. Some imperfections which it nevertheless had appear to have been overcome, as it is now introduced into several of the London breweries.

It is only within the last twenty years that much attention has been given to the construction of machines for the production of artificial cold on the large scale; but they have already received several important applications. In this country, besides being available for the production of ice; the extraction of certain salts from mixed solutions, such as sulphate of soda from common salt—the former separating at a temperature above that which keeps the latter in solution; the separation of paraffine from mineral oils; and in other chemical operations, as well as for cooling worts in breweries and distilleries, they are now turned to good account in bringing fresh meat from distant countries to our shores. In warm countries, besides other uses, they could be applied to cool large hospitals and public buildings, by sending a current of some cold liquid through pipes, just as we in Great Britain heat buildings with pipes through which hot water flows.

REFRIGERATION OF THE EARTH. That the earth is at present losing heat, is an immediate consequence of the observed fact, that the temperature of its crust *increases* as we descend; for, in any conducting body, the flux of heat is always from warmer to colder parts; and the rate at which heat is thus lost can be easily calculated if we know the conducting power (for heat) of the rocks forming the crust, and the rate at which the temperature increases with the depth under the surface; for the conductivity may be measured by the quantity of heat which, in unity of time, passes (per square foot of surface) through a layer of rock of 1 foot thickness, whose upper and lower surfaces are maintained at temperatures differing by 1° Fahr. Hence, if k be the conductivity of the crust, and if the temperature increases by 1° Fahr. every x feet of descent, the quantity of heat lost in unit of time from each square foot of surface, is measured by $\frac{k}{x}$. k and x can be determined by experiment for any particular locality, and thus the loss may be determined. These quantities vary very much in value in different localities, thus x is sometimes as great as 110, sometimes as small as 15. The value 50 is generally supposed to give a fair average—that is, for every 50 ft. of descent the temperature increases by 1° Fahr. Hence the stifling heat experienced in deep mines. At the depth of a mile the temperature would on this estimate exceed that of the surface by more than 100° Fahr. Beds of coal at such a depth could not be wrought, as the temperature would far exceed that of tropical climates.

Three methods of accounting for this increase of temperature toward the interior of the earth have been proposed: 1. That the earth was originally molten, either throughout or for a considerable depth over the whole surface; 2. That the internal heat is due to chemical combination; 3. That the earth, ages ago, passed through a region of space where the temperature was far above that of its present envelope.

Of (1) it is sufficient to say that such a state is the necessary consequence of impact, if the earth was formed by the aggregation of cosmical masses due to their mutual gravitation. It is scarcely doubted now that this is the origin of solar and stellar heat; and the fact of the moon's turning always the same face to the earth (see ROTATION), is most easily explained on the hypothesis of her original fluidity. The figure of the earth (see EARTH) is also a strong argument in favor of this hypothesis. This explanation of the origin of the earth's internal heat is obviously consistent with the increase of temperature as we descend below the surface—for a spherical mass of molten rock will evidently soon cool externally, while its low conductivity (rendered still lower by the high temperature) will prevent the interior from supplying anything at all equivalent to the loss at the surface. On this hypothesis the rate of loss of heat must constantly become smaller and smaller, but very slowly; and it is possible that a considerable portion of the earth's mass may still be in a melted state.

The second hypothesis is perfectly sufficient to account for observed facts, but is apparently unnecessary, since (1) has been shown to be, in the universe, a *vera causa*. It is only alluded to here because Lyell and other distinguished geologists have endeavored to show from it that the earth need not be losing heat on the whole, a result perfectly untenable. They suppose the internal heat to be generated by chemical combination, and then that the compounds so formed are again decomposed by electric currents produced by the heat (see THERMO-ELECTRICITY), and are thus prepared to combine again and reproduce the heat. Were this the case we should have a perpetual motion (q.v.), and, in the present state of science, this is known to be impossible.

The third hypothesis, proposed by Poisson, is easily shown to be inconsistent with known facts; for, if the passage through the warm region be supposed to have taken place from 1250 to 5,000 years ago, the temperature at the earth's surface must have been from 25° to 50° Fahr. above the present mean temperature, which is inconsistent with history. If it took place 20,000 years ago, the mean temperature must have been 100° Fahr. above its present value. Geology shows that this cannot be accepted. And, if it be supposed to have taken place more than 20,000 years ago, the requisite temperature must have been incompatible with the existence of animal or vegetable life.

From the above argument, which is taken from a paper by sir William Thomson in the *Transactions of the Royal Society of Edinburgh* (1862), it is obvious that the first hypothesis is that which we must, in the present state of our knowledge, adopt.

Supposing the temperature of melting rock to be from 7,000° to 10,000° Fahr. (and experiments seem to show that it lies somewhere between these limits), the present state of temperature of the crust indicates that the earth became solid somewhere between 100,000,000 and 200,000,000 years ago. These estimates are based on the known laws of conduction of heat discovered by Fourier, and the conductivity of rocks and soils, deduced by principal Forbes (q.v.) from observations made in the neighborhood of Edinburgh. But as these observations refer to conductivity at very moderate temperatures only, and as Forbes has shown that conductivity is in general lowered by heating, the lower limit above may possibly be reduced to *twenty million years*.

In conclusion, we may mention, to show how little the internal heat of the earth has to do with surface temperature, that Thomson has shown (*Proc. R. S. E.*, 1863–64) that if we accept the estimate of 1° Fahr. of increase of temperature for 50 ft. of descent, the earth's surface is heated (by conduction of heat from within) only $\frac{1}{75}$ of a degree Fahrenheit.

REFRIG'ERATOR. See FREEZING MIXTURES; and REFRIGERATING MACHINES.

REFUGEE' (Fr. *refugié*), a name given to persons who have fled from religious or political persecution in their own country, and taken refuge in another. The term was first applied to those Protestants who found an asylum in Britain and elsewhere at two different periods, first during the Flemish persecutions under the duke of Alva in 1567, and afterward in 1685, when Louis XIV. of France revoked the edict of Nantes. Of the numerous French artisans who settled in England on this last occasion, the most part Anglicized their names, as by substituting Young for "Le Jeune," Taylor for "Tellier," etc., so that their posterity can now hardly be recognized as of foreign origin. According to Lower (*Patronymica Britannica*) De Preux became Deprose, and "Richard Despair, a poor man," buried at East Grimstead, was, in the orthography of his forefathers, Despard. There were also refugee families of a higher class, some of whose descendants and representatives came to occupy a place in the peerage. The Bouveries, earls of Radnor, are descended from a French refugee family. The refugee family of Blaquière was raised to the Irish peerage; and Charles Shaw Lefevre, lord Eversley, is the representative of a family of Irish refugees. The military employment offered in Ireland after 1688 maintained a considerable number of foreign Protestants. Gen. Frederic Armand de Schomberg was raised by William III. to the peerage, becoming eventually duke of Schomberg. A Huguenot officer of hardly less celebrity was Henry Massue marquis de Ruvigny, created by William III. earl of Galway. Lord Ligonier was also of a noble Huguenot family, and England has had at least one refugee bishop in Dr. Majendie, bishop of Chester, and afterward of Bangor. Among other refugees of note may be enumerated sir John Houblon, lord mayor of London in 1689, one branch of whose family is now represented by lord Palmerston; Elias Bouherau or Boireau, D.D., whose descendant was created a baronet as sir Richard Borough of Baselden Park, Berkshire; as well as Martineaus, Bosanquets, and Papillons, whose descendants have attained more or less eminence in the country of their adoption. The first French revolution brought numerous political refugees to England, and Great Britain is noted throughout Europe for affording a ready asylum to refugees of all classes, both political and religious. Weiss's *History of the French Protestant Refugees, from the Revocation of the Edict of Nantes to the Present Time*, translated by Hardman (London, 1854); J. S. Burn's *History of the French, Walloon, Dutch, and other Foreign Protestant Refugees settled in England from the Reign of Henry VIII. to the Revocation of the Edict of Nantes.*

REFU'GIO, a co. in s. Texas, bordering on the gulf of Mexico; drained by the San Antonio and the Arkansas rivers, its n. and s. boundaries; 900 sq.m.; pop. '80, 1585—1412 of American birth, 336 colored. The county is almost entirely occupied as pasture land, and the number of cattle exported is very large. Co. seat, Refugio.

REGALBU'TO, or RAGALBUTO, a city in the island of Sicily, in the province of Catania, and 30 m. w.n.w. of the city of that name. It is beautifuly situated on a hill near the right bank of the river Salso, and with Mt. Etna bounding the prospect on the n.e. Its only object of interest is the cathedral. Pop. 9,000.

REGA'LIA, the ensigns of royalty, including more particularly the apparatus of a coronation. The regalia of England were, prior to the reformation, in the keeping of the monks of Westminster abbey, and they are still presented to the sovereign at the coronation by the dean and prebendaries of that church. During the civil war the crown and most of the regalia fell victims to Puritan zeal; and on the restoration of the royal family, new ensigns had to be made for the coronation of Charles II., which, with occasional alterations and repairs, have continued in use down to the present day. The regalia, strictly so called, consist of the crown, the scepter with the cross, the verge or rod with the dove, the so-called staff of Edward the confessor (made in reality for Charles II.), the blunt sword of mercy called Curtana, the two sharp swords of justice, spiritual and temporal, the ampulla or receptacle for the coronation oil, the anointing spoon (probably the only existing relic of the old regalia), the armillæ or bracelets, the spurs of chivalry, and various royal vestments. All these, with the exception of the vestments, are now exhibited in the jewel-room in the tower of London, in which are also a smaller crown, scepter, and orb for the coronation of a queen-consort, two other queen-consorts' scepters—one of ivory, made for Marie d'Este; and the state-crown of silver and diamonds, which was used at the coronation of queen Victoria, containing a large ruby and sapphire, the former said to have been worn by Edward the Black Prince. The prince of Wales's crown of gold, without stones, is modern.

The proper regalia of Scotland consist of the crown, the scepter, and the sword of state. The crown probably belongs to the time of Robert Bruce, and is adorned with crosses and fleurs de lis alternately. It was originally an open crown, but two concentric arches were added in the reign of James V., surmounted at the point of intersection by a mound of gold and a large cross patée. The scepter is of the time of James V.; the sword was a present from pope Julius II. to James IV. in 1507. During the civil war the regalia were removed by the earl marischal for safe custody from the crown-room of Edinburgh castle, their usual place of deposit, to his castle of Dunnottar; and while Dunnottar was besieged by the parliamentary army, the regalia were preserved by being conveyed by stratagem to the manse of Kinneff, by the wife of Ogilvy of Barras, the lieutenant-governor, and the wife of the minister of Kinneff. From the restoration to the union the regalia continued to be kept in the crown-room as formerly; at the beginning of each session they were delivered to the earl marischal or his deputy, in whose custody they remained while parliament was sitting, and were afterward restored to the charge of the treasurer. William, ninth earl marischal, who opposed the treaty of union in all its stages, declined to witness its consummation, but appeared by his deputy, who took a written protest that the regalia should not be removed from the castle of Edinburgh without warning given to him or his successor in office. From that time till 1818, the regalia remained locked in a chest in the crown-room, away from public gaze, and it came to be the general belief that they had been secretly conveyed away to London, an idea confirmed by the keeper of the jewel-office in the tower showing a crown which was alleged to be that of Scotland. On Feb. 4, 1818, an order being obtained by warrant under the sign-manual of George IV., then prince-regent, the chest in the crown-room was broken open, and the crown, sword, and scepter were found as they had been deposited at the union, along with a silver rod of office, supposed to be that of the lord high treasurer. They are now in the charge of the officers of state for Scotland, as commissioners for the custody of the regalia, and are exhibited in the crown-room, along with a ruby ring set with diamonds, worn by Charles I. at his coronation at Holyrood in 1633; the golden collar of the garter, sent by Elizabeth to James VI.; the St. George and dragon, or badge of the order of the garter; and the badge of the order of the thistle, with figures of St. Andrew and Anne of Denmark, set in diamonds. These latter insignia were bequeathed by cardinal York, the last of the Stuarts, to George IV., and sent to Edinburgh castle in 1830 by order of William IV.

REGALIA, or REGALE, RIGHT OF, a right in ecclesiastical things, claimed by sovereigns in virtue of the royal prerogative, which has frequently been the subject of controversy between kings and popes. It involved several points as to presentation to benefices, most of which formed the object from time to time of negotiation by concordat; but the most serious conflict arose out of the claim made by the crown to the revenues of vacant benefices, especially bishoprics, and the co-ordinate claim to keep the benefice or the see vacant for an indefinite period, in order to appropriate its revenue. This plainly abusive claim was one of the main grounds of complaint on the part of the popes as to the practice of lay investitures (q.v.), and it reached its height in England under the first Norman kings, especially William Rufus. The most memorable conflict, however, on the subject of the regalia, was that of Innocent XI. (q.v.) with Louis XIV., which was maintained with great pertinacity on both sides for several years, the king extending the claim to some of the French provinces, which had until then been exempt from it, and the pope refusing to confirm any of the appointments of Louis to the sees which became vacant, as long as the obnoxious claim should be persisted in. The dispute continued till after the death of Innocent, Louis XIV. having gone so far as to seize upon the papal territory of Avignon in reprisal; but it was adjusted in the following pontificate, the most obnoxious part of the claim being practically abandoned, although not formally withdrawn.

REGALITY, a species of territorial jurisdiction formerly existing in Scotland, nearly akin to a palatinate (q.v.) in England. The lands were given over by the sovereign *in* *liberam regalitatem* to some powerful noble, called a *lord of regality*, to control as he best might with the strong hand. The lord of regality exercised the highest prerogatives of the crown, including originally the four pleas, often having a complete court of his own, with seneschal, chancellor, chamberlain, and other officials, in imitation of royalty. An offender amenable to a court of regality might have been repledged from the sheriff, or even from the court of justiciary. Jurisdictions of regality were abolished by act 20 Geo. II. c. 50.

RE'GALS (perhaps from *rigabello*, an instrument used prior to the organ in the churches of Italy), a small portable finger-organ in use in the 16th and 17th centuries, and perhaps earlier. Many representations exist of this instrument, including one sculptured on Melrose abbey. The tubes rested on the air-chest, which was filled by the bellows; and the bellows were managed with one hand, and the keys with the other. Until 80 years ago there existed in the royal household an officer called the *tuner of regals.*

REGARDANT, a term used in heraldry with reference to an animal whose head is turned backward. See PASSANT and RAMPANT.

REGAT'TA. This word originated in the Venetian dialect, and signified a boat-race, held annually with great solemnity among the gondoliers. Thence the expression has extended its meaning, and is now applied to all rowing or sailing matches indiscriminately, and especially to the contests between yachts.

REGELA'TION. This is an exceedingly ill-chosen term for a somewhat obscure phenomenon, inasmuch as it implies a previous state which may not have existed. Unfortunately, the term has come into general use, and we must make the best of it. The principal fact to be explained is the adhesion of two pieces of ice brought into contact, not merely in air, but even when both are immersed in water at such temperatures as 100° Fahr. Several explanations have been proposed, of which we may specially mention those of Faraday, Forbes, and J. Thomson.

Faraday's idea seemed to be, that in liquid and solid bodies the proximity of particles in a particular state tends to produce the same state in other particles; and thus, that a film of water between two plates of ice tends to assume the solid state. There are many singular phenomena in physical science which are apparently explicable by this suggestion; but with all due deference to so great an authority, the so-called explanation seems merely to *shift* the difficulty, without in any way overcoming it.

Forbes starts with the assumption, that ice is essentially colder than water, and therefore that there is constantly a transfer of heat from water to ice which is in contact with it; the effect being to cover the surface of the ice with a film of half-melted ice or half-frozen water. Such a film, existing between two slabs of ice, would part with heat to both, and would freeze without melting the adjacent ice. This explanation would be satisfactory if the postulate could be granted, but it seems very improbable that there is any such essential difference of temperature between solid and liquid water.

The explanation proposed by prof. J. Thomson is undoubtedly founded on a *vera causa*, but there may be some hesitation in allowing that the cause is adequate to the production of the observed effect in every case. It is certain, however, that it accounts for at least part of the phenomenon. It is founded on his very beautiful theoretical discovery that *the freezing-point of water is lowered by pressure*, which was experimentally verified by W. Thomson. Hence, if two slabs of ice be pressed together, at the points of greatest pressure the ice will be melted; its latent heat of fusion must be drawn from surrounding bodies, and thus cold is produced which will freeze part of the film of water between the two slabs. The points of greatest pressure will thus be shifted, and the process of melting and regelation may go on indefinitely. Objections to this explanation were advanced by Faraday and Forbes, who showed that slabs of ice freeze together when suspended vertically with the view of avoiding pressure between them. But J. Thomson shows that the capillary forces of the film of water which must (in these cases) be between the slabs (for without directly applied pressure the effect cannot be obtained with slabs of *dry* ice), are sufficient to produce the pressure requisite for the application of his mode of explanation.

This part of the subject cannot be said to be completely cleared up; but the theory of J. Thomson has been applied with perfect success to the explanation of the very extraordinary phenomena observed in glaciers (q.v.), where enormous forces are constantly at work. It evidently at once accounts for the result of observation, due to Rendu and Forbes, that a glacier moves like a viscous fluid: in fact, it shows why and how the mass gives way to pressure, and how it is refrozen in a new form, which in turn gives way to the new distribution of pressure. The explanation of the veined structure, the formation of clear ice from snow, etc., are all easily deduced from it.

The phenomena of regelation are easily seen in the making of snow-balls, which is well known to be impossible, by the hands at least, when the snow has been exposed to great cold, and is therefore dry. But, even in this case, the effect is easily obtained by the application of pressure sufficient to melt the ice, as is well seen in wheel-tracks, etc. By means of a Bramah's press, it is easy to convert a snow-ball into a sphere of perfectly clear ice.

REGENERATION is a theological expression denoting the spiritual change which passes on all men in becoming Christians. There are various interpretations of the mode and meaning of this change, but its necessity in some shape or another may be said to be admitted by all branches of the Christian church. By all, man is supposed, as the condition of his becoming truly Christian, to pass from a state of nature to a state of regeneration, from a state in which he obeys the mere impulses of the natural life to a state in which a new and higher—a divine—life has been awakened in him. The words of our Lord to Nicodemus: "Verily, verily, I say unto thee, except a man be born again, he cannot see the kingdom of God," are accepted as the expression of this universal necessity by the Christian church. It may be further stated that every branch of the Catholic church recognizes, although under very different conditions, the Holy Spirit as the author of this change. The change, in its real character, is spiritual, and spiritually induced. According to certain sections of the Christian church, however, the change is inseparably involved with Christian baptism, in all cases; while other sections do not acknowledge any essential connection between baptism and regeneration. In the view of the former, baptism constitutes always a real point of transition from the natural to the spiritual life. The grace of baptism is the grace of regeneration; the laver of baptism is the laver of regeneration, not merely in any formal sense, but in a real and living sense, so that every baptized person—or at least every rightly baptized person—has already become a Christian truly, although he may fall away from the grace that he has received. This is what is commonly called the high church doctrine of regeneration. In the view of others, regeneration is a special, conscious process, which takes place independently of baptism, or of any other outward fact or ceremony. It implies a sensible experience —an awakening whereby men come to see the evil of sin, and the divine displeasure against sin, and, through the Holy Spirit, are born again, put away their former evil life, and begin to live a new divine life; and many Christians have spoken with rapture of this *experience*, of its thoroughness, its suddenness, its immediateness. There are different shades of opinion on the subject, some holding it as a condition of regeneration, that the regenerate should be able to recount, or at least give some precise idea of the time and manner of the change through which they have passed; others repudiating such views as savoring of fanaticism, yet holding no less to the spiritual definiteness of the change, independently of church forms of any kind; and such views, in contradistinction to the high church doctrine, have received the name of evangelical. The idea that regeneration is essentially involved in baptism, or identical with baptism, is supposed by many Christians to be a peculiarly unevangelical idea, opposed to the spirituality and freedom of divine grace.

RE'GENSBURG, or RATISBON (Lat. *Reginum*, *Radespona*), the capital of the Bavarian province of Oberpfalz and Regensburg, is situated on the right bank of the Danube, at the mouth of the Regen, 65 m. n.n.e. of Munich. Pop. '75, 31,487. Regensburg, which was formerly a free city of the empire and the seat of the German diet, is pleasantly situated in the midst of a broad and fruitful valley, lying 1000 ft. above the level of the sea. It presents a strongly marked mediæval character, with its ancient ramparts, fosses, and gates, and its narrow crooked streets, with their high, many-cornered, gabled houses, while it retains many interesting monuments of its importance and wealth during the middle ages. Among its 13 Roman Catholic churches, the most remarkable is the cathedral, begun in 1275, and not completed till the middle of the 17th c., which ranks, since its restoration in 1830–38, as one of the noblest specimens of German architecture, and is especially noteworthy for the fine monuments of its former bishops, and for its silver altar and numerous painted-glass windows, restored in 1830. The Scottish church of St. James (secularized in 1862) dates from the 12th c., and is built in the pure Byzantine style. There are several monasteries in Regensburg, and three Protestant churches. The old town-hall was used for a century and a half as the place of meeting for the imperial diet. The royal library contains 60,000 volumes. The city has several highly ornamental fountains, and contains a monument to Kepler, the astronomer, who died in Regensburg. A stone bridge connects Regensburg with the busy trading suburb of Stadt am Hof. The manufactures of Regensburg include gold, silver, brass, and steel wares, paper, earthenware, beet-root sugar, brandy, and candles and soap of superior quality. Since 1853 it has been a free port; and in addition to ship-building, which is carried on with much activity, the trading community is extensively engaged in the transport of corn, wood, and salt. Regensburg, as the principal seat of the Danube steam-navigation company, is an especially busy trading port.

Regensburg, which ranks as one of the most ancient cities of Germany, and was built by the Romans, by whom it was named *Reginum*, was a place of considerable commercial importance in the early ages of Christianity. In the year 750 a bishopric was founded here, which embraced a large portion of Bavaria and the Upper Palatinate. Under the emperor Frederick I., it was relieved from the subjection under which it had previously stood to the dukes of Bavaria, and declared a free city. During the middle ages it was the chief seat of the Indo-Levantine trade, and was one of the wealthiest and most populous cities of southern Germany. From 1663 to the dissolution of the German empire in 1806, Regensburg was, with a very short interregnum, the seat of the German diet; and after undergoing various changes of fortune during the period of Napoleon's power, was finally ceded to Bavaria, of which it has since formed an integral part.

RE'GENT (Lat. *rego*, I govern), one who exercises the power without having the name of a king. In a hereditary monarchy there are various circumstances which may necessitate the delegation of the sovereign power—as the devolution of the crown on a minor too young to be intrusted with the kingly office; the incapacity of the sovereign by illness, mental or bodily; and the case of absence from the realm. A regent under the title of protector (q.v.) has often been appointed to exercise royal authority in the sovereign's minority, the latest instance in England being during the minority of Edward VI.; and regents and councils of regency have been sometimes named by the sovereign to provide for the probable nonage of his heir. According to Coke, the surest way of making such an appointment is by authority of the great council in parliament: and in recent times the appointment has generally been made by statute. During the frequent absences of the first two kings of the house of Hanover in their continental dominions, it was the practice to appoint regents or *lords justices* (q.v.) to exercise the powers of sovereign. In 1788, when George III. became incapacitated from exercising the kingly office by insanity, it became a question whether his eldest son, then of full age, had a right to be regent, or whether the nomination rested with parliament. The chief political authorities of the time were divided in their judgment, but the king's recovery ended the discussion. On the return of the malady, all parties were unanimous that the regency should be conferred on the prince of Wales; this was done, however, by parliament, and for the first year of his regency, certain restrictions were imposed, which were to be removed in the case—which eventually occurred—of the king's continued illness.

In 1830 a regency bill was passed, providing for the administration of the government, should the crown descend to the princess Victoria before she attained eighteen years of age; and in 1840 a regency bill (3 and 4 Vict. c. 52) was passed, providing that the late prince consort should be regent, in the event of the demise of the queen, her next lineal successor being under age. During her present majesty's various short absences from the country there has been no delegation of the royal power.

REGENT OF A UNIVERSITY. In the university of Paris, where this as well as other learned distinctions originated, every master of arts possessed the privilege, which he was bound to exercise, of delivering public lectures. The same was the case at first in the universities of Oxford and Cambridge. In process of time, however—about the middle of the 13th c.—the title of master became a degree attainable by any one after a certain amount of residence, and a certain proficiency, and the duty of lecturing was confined to a limited number of graduates, called *regents*. The regents were eventually succeeded in the office of lecturing by the established professors. In the English universities a master of arts becomes a regent after a short period, and is supposed to read lectures during the year of his regency. The regents still form the governing body in the convocation and congregation at Oxford, and in the senate of Cambridge. In the Scottish universities, according to their early constitution, the regents were the lecturers; and celibacy was enforced on them down to about the middle of the 17th century.

REGGEL'LO, a small t. of Italy, in the province of Florence, and 16 m. e.s.e. of the city of that name. It is surrounded by beautiful hills, which produce wines, fruits, and grain in abundance. Pop. 10,200.

REGGIO (REGGIO NELL' EMILIA), a province of n. Italy, having the river Po for its n.w. boundary; 884 sq.m.; pop. '72, 240,635. It borders on Cremona, Mantua, Modena, Massa e Carrara, and Parma, and is drained by the Enza, an affluent of the Po, and the Crostolo, rising in the Apennines and emptying into the Po. A road crossing the central Apennines leads from Tirizzano to Reggio, its capital. It is divided into the districts of Reggio d' Emilia and Guastalla. Its agricultural products are wheat, maize, rice, pulse, hemp, etc., and these, with dried fruits and marble, are largely exported. The peasants in the mountains subsist principally on corn-meal mush, flour, beans, and chestnuts. The most important manufactures are linen, silk, canvas, leather, carriages, and articles made of horn, wood, and ivory. It has an active trade in country produce and cattle. Capital, Reggio.

REG'GIO (anciently, *Rhegium Julii*), a seaport in the south of Italy, the chief city of the province of Reggio (formerly Calabria Ultra I.), stands on the shore of the strait of Messina, 10 m. s.e. of the city of Messina in Sicily. Pop. (1871) of town and suburbs, 29,854; of commune, 35,235. It is well built; its streets are wide and regular, and it is surrounded by a wall flanked by towers. A fine cathedral, a hospital, and several educational institutions are the principal buildings. Manufactures of linens, stockings, silks, and odoriferous waters, are carried on. The fisheries of the vicinity are profitable, and abound in the pinna (q.v.), a mollusk, the very delicate skin of which is made into gloves, stockings, and caps of great value. The climate of Reggio is salubrious, and the scenery of the vicinity exceedingly beautiful; the soil is rich, and produces fruit-bearing plants, both of the temperate and tropical zones, in great variety. Behind the city rises Aspromonte, a mountain of the Apennines, where Garibaldi was wounded and taken prisoner in 1862.

The ancient *Rhegium* was founded by the Greeks, was governed wisely and justly by Anaxilas, and afterward by his sons, 494–61 B.C. It was besieged and destroyed by Dionysius the elder, rebuilt by Dionysius the younger, and afterward united to Rome.

REGGIO, a city of central Italy, formerly belonging to the duchy of Modena, and now included in the province of that name, stands on the ancient *Via Emilia*, 16 m. w.n.w. of the city of Modena. Reggio is situated on a fertile plain on the right bank of the Crostolo; is surrounded by a wall; contains beautiful palaces, and a fine cathedral of the 15th c. and other churches, which possess famous paintings; the *Teatro Nuovo*, one of the finest theaters in Italy; the lunatic asylum; a museum, an academy, and many other institutions. It is a rich city, and has manufactures of cotton, of cloth, and of other stuffs. Population of the town proper about 20,000.

RE'GIAM MAJESTA'TEM is the title given to an ancient collection of laws bearing to have been compiled by order of David I., king of Scotland. The authenticity of the work has been controverted, the prevalent opinion being that it is a compilation from the English work of Gianville, called the *Regiam Potestatem*, and that the publication of the book was an artifice of Edward I. to further his design of assimilating the Scotch law to that of England.

REGIL'LUS, LAKE, anciently a small lake of Latium, to the s.e. of Rome, somewhere about the foot of the Tusculan hills. If Gell's conjecture as to its situation be correct, it must have occupied an extinct volcanic crater at a place called Cornufelle, near the modern Frascati. Lake Regillus is celebrated in the semi-legendary history of Rome as the scene (496 B.C.) of a great battle between the Romans under Aulus Postumius, and the Latins, on behalf of the banished Tarquin, under O. Mamilius. The latter were entirely defeated, and an end, it is said, was put to the efforts of Tarquin to force his return to the city.

REGIMENT, in all modern armies, is a colonel's command, and the largest *permanent* association of soldiers. Regiments may be combined into brigades, brigades into divisions, and divisions into armies; but these combinations are but temporary, while in the regiment the same officers serve continually, and in command of the same body of men. The strength of a regiment may vary greatly even in the same army, as each may comprise any number of battalions. French and Austrian regiments have ordinarily 4 to 6 battalions. Among British infantry, the smallest regiments are those numbered from the 26th upward (except the 60th), which have 600 men each, composing one battalion. The 60th and rifle brigade comprise each 4 battalions. The whole artillery force is comprised in one regiment. The strength of a regiment is changed from time to time; usually by the addition or withdrawal of private soldiers. The present plan would be, in case of war, to raise the skeleton regiment to war strength by calling in men from the army reserve.

The regimental system could only exist where standing armies are maintained. Accordingly, the Macedonian syntagmata and the Roman cohorts were evidently regiments in a strict sense. During the middle ages, feudal organization precluded the system, and its first reappearance was in France. Francis I. formed legions of 6,000 men each, which were divided into independent companies, the latter being, in fact, battalions, and each legion a regiment. The word regiment began to be applied to bodies of British troops in Elizabeth's reign; regiments are spoken of at the time of the Armada, 1588, and as composing the force in Ireland, 1598. From that time forward, the army and militia of Britain have been organized into regiments. Charles I. and the parliament each raised regiments, all of which were disbanded at the restoration, with the exception of the lord-general's regiment of foot, and his life-guard of horse. These two were re-engaged (1661), and form the present Coldstream guards and royal horse-guards. In the same year, a Scotch corps of 1700 men, which had taken service in France in the time of James I., returned to England, and was included in the British army as the 1st foot. Other regiments of infantry were gradually raised as required. In 1693 was raised the 1st troop of horse grenadier guards, and the 2d troop in 1702. These were disbanded in 1782, and reformed as the 1st and 2d life-guards, which still exist. Besides cavalry and infantry, the British army comprises the regiment of artillery, and the corps of royal engineers, and military train.

The total regiments of the British army for the year 1876–77 were:

		Regiments.	Officers and Men.	
Life-Guards		2	868	
Horse-Guards (Blues)		1	434	
Cavalry of the Line—				
Dragoon Guards	7	28	15,978	
Dragoons	3			
Hussars	13			
Lancers	5			
Horse Artillery		1	5,633	in 6 brigades.
Foot Artillery			29,291	in 26 brigades.
Royal Engineers		1	5,710	
Foot Guards		3	5,950	in 7 battalions.
Infantry of the Line		110	119,483	in 141 battalions.
Army Hospital Corps		1	1,574	
Army Service Corps		1	3,014	
West India Regiments (black troops)		2	1,882	in 2 battalions.
Colonial Corps		1	649	in 1 battalion.
Total		151	190,411	

Each regiment is nominally commanded by a col., who is an old general officer, and whose office is merely a sinecure. The real command rests with the lieut.col. in each battalion, who is assisted by a major, and has for a staff an adjutant, a quartermaster, a paymaster, and a surgeon. The regiment or battalion is divided into companies in infantry, engineers, and army service corps; into troops in the cavalry. The artillery is divided into 30 brigades, each of which is as large as an ordinary regiment. The brigade is subdivided into batteries, which are the working units. The working officers are captain and two lieutenants to each infantry company or cavalry troop; major, captain, three lieutenants per battery of artillery.

The following table shows the allotment of the several ranks in each arm at home:

	Infantry Battalion of 8 Companies.	Cavalry Regiment of 8 Troops.	Field-artillery Brigade of 7 Batteries.
Officers—			
Staff	5	7	11
Companies, troops, or batteries	21	21	35
Non-commissioned officers—			
Staff	10	11	6
Companies, etc	48	48	77
Rank and file—			
Corporals, etc	40	32	70
Privates	480	415	934
Total	604	534	1133

It is to be observed that either of the above formations is augmented at once by the addition of privates, without any increase in the officers or non-commissioned officers. The new recruits, or men from the reserve, being distributed among the troops or companies, as many as 500 could be received without sensibly impairing the discipline of the regiment. See Uniform.

REGIMENTAL SCHOOLS are educational establishments, maintained by the state in every regiment, for the instruction of the soldiers and their children. There is a schoolmaster for the soldiers and elder boys; and a trained schoolmistress—usually the schoolmaster's wife—to teach the girls and infants of both sexes. Attendance at the schools is optional. Religious instruction takes place on Monday mornings, when children can be kept from school if their parents object to the instruction imparted. The girls' school comprises an "industrial" section for needlework, etc. The charge for regimental schools for the year 1876-77 was £36,415.

REGIOMONTANUS, the name adopted by an early German mathematician, called Johann Müller, probably because he was a native of Königsberg (of which *Regiomontanus* seems intended as a Latin equivalent), where he was born June 6, 1436. Which Königsberg, however, is to be understood is a disputed point among his biographers, but Delambre and others favor the one in Franconia. Regiomontanus was sent by his parents to Leipsic at the age of 12, and there made such rapid and extraordinary progress in mathematical studies that by the time he was 16 he could find nobody, it is said, in the Saxon university competent to give him further instructions. He therefore removed to Vienna, where, in 1461, he became professor of astronomy, but was permitted to reside in Italy for some time, in order to study Greek, with the view of making himself acquainted with the writings of the Alexandrian geometricians and astronomers. He appears while here to have gone through a great amount of laborious work in the collection, collation, and copying of Greek MSS., in studying the language (under the best masters, such as Theodore Gaza), making astronomical observations, lecturing to the students of Padua on the Arabian philosopher Alfragan, and composing his celebrated work, *De Triangulis Planis et Sphæricis* (first published at Nuremberg, 57 years after his death), which, according to Delambre, gives a very complete account of what was then known of plane and spherical trigonometry. In 1464 Regiomontanus returned to Vienna, where he remained for some years in the discharge of his duties as professor, but afterward removed to Buda, in Hungary, on the invitation of Mathias Corvinus. In 1471 he went to Nuremberg, where he lived in close intimacy with a wealthy and enlightened citizen, named Bernhard Walther, who furnished him, among other things, with means to start a book-printing establishment, and to construct various astronomical instruments, by which they were enabled to demonstrate the inaccuracies of the "Alphonsine tables." Their united labors are to be found in the *Observationes* 30 *Annorum à J. Regiomontano et B. Walthero* (Nuremberg, 1544). Regiomontanus now devoted himself vigorously to the composition of scientific works, among others, his *Kalendarium Novum* (ante 1475), which is thought to have been the first almanac that ever appeared in Europe. This last work excited great attention among the learned and powerful of the time, and the first edition was rapidly sold off. The king of Hungary presented Regiomontanus with a gift of 800 or 1200 golden crowns. Pope Sixtus IV. now sought his assistance in his meditated reformation of the calendar, and to secure his services conferred on him the dignity of archbishop of Ratisbon. He now left Nuremberg, and proceeded again to Rome, where, however, he died, July 6, 1476, at the early age of 41. Regiomontanus's premature death was a serious loss to the science of mathematics. He is pronounced by competent authorities the most learned astronomer of his age; and his sagacity and ardor were such as to promise important acquisitions to our knowledge of celestial physics. A list of his numerous writings is given by Delambre in the *Biographie Universelle.*

REGIONS OF THE BODY, various portions of the surface of the human body into which it has been divided by anatomists for convenience of description. The system of division varies, sometimes being general, sometimes more or less specific, or minute. Thus, in general terms, we may speak of the thoracic region, implying the whole surface of the thorax, anterior, posterior, and lateral, or that portion of the body inclosed by the ribs, sternum, and dorsal vertebræ. A further division of the thorax includes that just named, as, anterior thoracic region, lateral thoracic regions, and posterior thoracic region. The anterior thoracic region is again subdivided into the sternal, or that part covered by the sternum bone (see SKELETON); two clavicular, those parts indicated by the collar bones, or clavicles; two subclavian, or those parts just below the clavicles; two mammary, or those regions corresponding to the breasts, and two infra-mammary, or regions just below the breasts (of course these double regions are named respectively right and left, as left mammary, right mammary region, etc.). The sternal region is again subdivided into upper and lower, and sometimes into upper, middle, and lower regions. The lateral thoracic regions are each subdivided into axillary, lateral, and lower lateral, and the posterior thoracic region is subdivided on each side of the spine into scapular, corresponding to the shoulder-blade; and inter-scapular, between the shoulder-blade and the spine. Sometimes another region is added, called the dorsal, corresponding to the base of the lung on each side, but sometimes the dorsal region is used in a more general sense, including a great portion of the posterior thoracic, on each side of the spine; and it may be remarked here that we are only sketching the most commonly adopted topography. These regions are not always very sharply defined, but the subclavian region may be said accurately to comprise that portion of either side of the thorax embraced between the clavicle, or collar bone, and the upper part of the fourth rib, and included laterally by the deltoid muscle and the sternum. Beneath it lies the upper lobe of the lung and the main bronchial tube, and on the right side, beside this, the descending vena-cava (see CIRCULATION), and a portion of the arch of the aorta. The mammary region extends from the fourth to the seventh rib, on either side, bounded laterally by the sternum and a line drawn vertically about 2 in. outside of the nipple. Beneath this region, on the right side, the lung occupies the whole space, and the sounds on percussion given by a healthy lung are clear, except at the very lower border, where the liver and diaphragm are very near and produce dullness. On the left side the lung is partly displaced by the heart, and consequently at this portion percussion elicits dullness of sound. This sketch of the thoracic regions will suffice for the use of the general reader, and to show the utility of such divisions. The lower part of the body is usually divided, in a general way, into abdominal, lumbar, and sacral regions, and in a still more general way may be added a pelvic region, although this would include portions of other regions. If a horizontal line is drawn round the body in a level with the lower end of the sternum (the ensiform cartilage) it will mark the superior boundary of the abdomen; and if another horizontal line is drawn on a level with the cartilages of the last false ribs, and still another on a level with the crests of the hip bones (ilia), three horizontal divisions or zones will be formed, one of them being below the lower (third) line. If now two lines, one on each side, are drawn from the upper horizontal line vertically downward to the end of the trunk, and between 3 and 4 in. on each side of the center (technically intersecting the middle of Poupart's ligament), each of the zones will be divided into three sub-regions. The three central regions, from above downwards are named epigastric, umbilical, and hypogastric, the epigastric lying over the stomach, and the hypogastric, (sometimes called the pubic) being the lowest central region. On each side of this central tier of regions there are, from above downward, the hypochondriac, the lumbar (sometimes called the iliac), and inguinal regions. These regions are of great importance in descriptive anatomy, and must be familiar to the surgeon as well as the physician. They ought also to be recognized by every well-educated person. Beneath the right hypochondriac region (called hypochondriac because beneath the cartilages of the false or floating ribs) is the right lobe of the liver, the gall bladder, the duodenum (see DIGESTION), the pancreas, and the upper part of the right kidney. Beneath the right lumbar region lies that part of the large intestine called the ascending colon, and also some convolutions of the small intestines. The ascending colon, and its pouch-like commencement at the termination of the ilium, the last division of the small intestines, are important divisions of the alimentary canal. Beneath the right inguinal region lies the lower, pouch-like end of the ascending colon (its commencement) before mentioned, and its attachment, the appendix vermiformis. Beneath the left hypochondriac region are the greater or splenic end of the stomach, the spleen (q.v.) and extremity of the pancreas (q.v.). the splenic flexure of the colon and the upper half of the left kidney. Beneath the left lumbar region lies the descending colon, the lower part of the left kidney, and some convolutions of the small intestines. Beneath the left inguinal region lies the sigmoid flexure of the colon (that part of it which is next the commencement of the rectum) and the left ureter. See URETERS. The sacral region of the body corresponds to that portion of the pelvis called the sacrum, the lower portion of the spinal column. Besides the regions enumerated, there is the general cervical region (region of the neck), divided into anterior, posterior, and lateral cervical regions, whose locations are obvious. The head is generally divided into a cranial and a facial region. The cranial region is again divided into frontal, coronal, occipital, parietal, and temporal regions. Leaving the surface we also have the basilar region of the cranium, the floor of the skull, upon which the brain rests. See SKELETON. The facial region is divided into upper and lower facial. Passing to the upper extremities there are the acromial, or shoulder region, corresponding to the deltoid muscle; the anterior humeral region, corresponding to the front of the arm; and the posterior humeral region, corresponding to the back of the arm. We may also speak of the external and internal lateral humeral regions, to aid description. The brachial regions, anterior and posterior, are terms applied principally to the anterior and posterior aspects of the fore-arm, although the word brachium means the whole arm, from the shoulder to the wrist. We also have a radial region, corresponding to the radius, and an ulnar region, corresponding to the ulna. At the wrist is the carpal region, anterior and posterior; in the hand the dorsal or metacarpal (back of the hand), and the palmar regions. Passing to the lower extremities, in the hip there is the gluteal region (the buttocks), a portion of the iliac region (the hip and thigh joint), the anterior femoral region (the fore part of the thigh), the posterior femoral region (the posterior surface of the thigh), internal and external (lateral) femoral regions; poplitcal region, immediately behind the knee joint; the anterior tibio-fibular region, the front aspect of the leg, corresponding to the shin: the posterior tibio-fibular region, corresponding to the calf and posterior aspect of the leg; the dorsal region of the foot, corresponding to the instep; and the plantar region, corresponding to the sole of the foot.

REGISTER, LORD, or LORD CLERK REGISTER, a Scottish officer of state who has the custody of the national archives. He was in former times the principal clerk of the kingdom, from whom all other clerks derived their authority. The office used to be held at pleasure, but since 1777 has been conferred for life. The lord register is assisted in his duties by a resident deputy.

REGISTER OF ORGAN, a name sometimes given to the sets of pipes or stops of an organ. See ORGAN.

REGISTERS OF VOICE, a term applied to the different kinds of sound distinguishable in the graduated scale of notes produced by any individual voice. Those sounds which, like the ordinary sounds of speech, proceed naturally and freely from the voice constitute what is called the *chest-voice*. By means of a strained contraction of the glottis, notes may be produced of a higher pitch than those of the chest voice; these are called *falsetto* or *head voice*, and have a peculiar flute or flageolet-like quality of their own. Though often sweet and exceedingly pleasing, they cannot be used for a length of time without some amount of constraint or effort, and they are never so powerful, so open, or so impressive as the chest voice. The lower notes and, in most voices, by far the greater number of notes belong to the chest voice, the falsetto being only employed in the higher and highest sounds. The sounds produced by the head voice are called the *upper register*, those produced by the chest voice the *lower register*, of the voice; and such notes of the chest voice as may also be produced by the falsetto are said to belong to the *middle register*. In a properly trained voice the falsetto is so blended with the chest voice that there is no perceptible break between them.

REGISTRATION OF BIRTHS, DEATHS, AND MARRIAGES is an improvement introduced in modern times, and ingrafted on the law and social customs of the United Kingdom for the purpose of keeping an exact account of important facts connected with the population of the country and its social progress. In England the first act for this purpose was passed in 1836, and a general registry-office was provided in London (at Somerset house) for England and Wales. But even before the new arrangement there had been long in operation an ecclesiastical mode of registration of marriages, baptisms, and burials in connection with each parish church, the officiating minister being required to keep such a register. By that act, which still retains its force as to baptisms and burials, registers of public and private baptisms, and burials solemnized according to the rites of the Established church in any parish or chapelry, are to be kept, and entries made by the minister within seven days at most after the ceremony. These registers are to be transmitted annually to the registrar of the diocese, who keeps the same and allows inspection on payment of certain fees—severe penalties being incurred by any one who forges or injures the register. This mode of registration was found to be insufficient for statistical purposes, for it was confined only to births and deaths so far as the ceremonies of the church extended: and hence a systematic plan was instituted in 1836 by the acts 6 and 7 Will. IV. c. 85, 86, which have been since amended by subsequent acts. The head of the office is the registrar-general. Every poor-law union throughout the country was subdivided into districts for the purposes of the acts. In each district a registrar, locally resident, is appointed, and a superintendent registrar is put over these.—1. As regards *births*, it is the duty of the registrar to inform himself of every birth that takes place in his district, and to record the particulars without fee or reward except such as the act authorizes him to take. The forms of the register-books are all settled by the act of parliament, and include a statement of the date of birth, name (if any), sex; name and surname of the father, and name and maiden surname of the mother; rank or profession of the father; signature, description, and residence of the informant: date of registration; signature of registrar; and baptismal name of child, if added after registration. It is not incumbent on the parent or occupier of the house where the child is born to give information; but upon being requested to do so, they are bound, within forty-two days after the birth, to give the particulars touching the birth to the registrar. In case of foundlings, alive or dead, and children born in workhouses, jails, etc., the overseers, coroner, master or jailer, respectively, must give such particulars. No fee is payable by the parent, etc., who gives information within the forty-two days. After that period any person present at the birth, or the father or guardian, may, within six months, make a solemn declaration as to the truth of the particulars, and require the particulars to be registered: but he must pay a fee of 7s. 6d., unless the delay was not occasioned by the party's fault. If registration is required to be made after forty-two days, and within six months, except as now stated, the party incurs a penalty of £50. After six months from the birth the registrar is not allowed to register the birth, under a penalty of £50, unless the child was born at sea.

2. *Marriages.*—With regard to marriages which are performed in the Established church, every officiating clergyman is required, immediately after the office of matrimony solemnized by him, to register in duplicate the marriage according to a form prescribed by the statute, and one of the duplicates is to be forwarded to the superintendent-registrar. The form states the date of marriage; the name and surname of each of the parties; the age as to minority; condition as to previous marriage; rank or profession; residence of each at the time of the marriage; and the name, surname, and rank or profession of the father of each of the parties. Every marriage in England which does not take place in a parish church or chapelry of the Established church must take place either in a registered building—and most of the chapels of dissenters are so registered—or in the office of the superintendent-registrar. In the two latter cases it is necessary that the registrar be present in the registered building at the time, or that the superntendent-registrar be present in his office at the time with witnesses. In such cases the registrar or superintendent-registrar himself registers the marriage so celebrated.

3. As to *deaths*, every registrar is required to inform himself carefully of every death within his district, and he is bound to enter the particulars in the form required by statute. The form contains a statement of the date of death, name and surname, sex, age, rank or profession, cause of death, name and residence of the informant, and date of registration. The occupier of the house in which the death occurs, if none of the parties present at the death shall have previously informed the registrar, must, within eight days after the death, on being requested, give such information. Four times every year, the district-registrar sends a certified copy of all the deaths to the superintendent-registrar, and when the book is filled, he sends the book itself. These are sent on, and kept in the general register-house in London. Besides the registers kept since the passing of the act in 1836, many of the older registers have been collected, and put under the care of the registrar general. At the general office in London, indexes are kept of all the certified copies of the registers, and every person is entitled, on payment of a fee, to search them, and have a certified copy. For a general search of all these indexes, a fee of 20s. is paid; for a search of a particular index, 1s. is paid, and 2s. 6d. for a certified copy. This certified copy is sealed with the seal of the office, and is evidence in all courts. During the time the register is in the hand of the superintendent-registrar, he is bound also to keep an index, charging a fee of 5s. for a general search, and 1s. for a particular search.

In Ireland the system of registration of births, deaths, and marriages was introduced in 1863. By the statute 26 and 27 Vict. c. 11, a statute passed relating to births and deaths, a general register-office was provided in Dublin, and a registrar-general appointed. The country was subdivided into districts. The provisions of the English act are imitated, except that parents and occupiers of houses are bound to furnish the information of births within three months. A penalty of 20s. is incurred by parents, occupiers, or persons present, who neglect to give notice of the births and deaths; but the penalty is not incurred if the omission was accidental or not willful. By a statute of the same year (26 and 27 Vict. c. 27), the minister neglecting or refusing to register a marriage, is liable to a penalty of £40; and in other cases, the registrar is bound to register it. By 26 and 27 Vict. c. 90, a like provision is made for a general register of marriages.

In Scotland a system of registration of births, marriages, and deaths was introduced in 1854, by the act 17 and 18 Vict. c. 80. A registrar-general and a registry-office are provided in Edinburgh; the parochial board of each parish appointing the parish registrar, subject to the sheriff altering or combining districts. Similiar provisions are made by that act and the subsequent acts of 18 and 19 Vict. c. 29, and 23 and 24 Vict. c. 85. Owing to the difficulty of discovering regular and irregular marriages, detailed provisions are required, and the husband, or, in his default, the wife, is, under a penalty of £10, bound to send the particulars. The details of the Scotch acts secure more accurate statistics than the English acts, particularly as regards illegitimate births.

REGISTRATION OF DEEDS AND WRITS, in the law of Scotland, is an important feature of the administration of the law. The general registration is authorized either by virtue of a clause of registration inserted in a particular deed, or under the old act of parliament of 1698, c. 4, which applies to all probative writs whatever. The clause of registration arose from the practice of churchmen drawing the enforcement of ordinary contracts within their jurisdiction, by causing the parties to consent that the court should, as it were, execute diligence at once if the obligation were not fulfilled. The clause used to be in the form of an authority given to a procurator to go before a judge, and consent to a decree in terms of the obligation; but it is now enough to use this form: "I consent to the registration hereof for preservation (or for preservation and execution)." Hence, when money is not paid at the time appointed, diligence issues at once on application of the creditor for execution. The practice is now almost universal to insert a clause of registration in deeds stipulating for money payments, especially bonds. When there is a clause of registration, the principal deed is retained in the register, and an attested copy or extract, authenticated by the clerk, and authorizing diligence, is given out, and a copy of the deed is entered in a book. When the deed has no clause of registration, it is recorded as a probative writ only, and the principal deed is marked by the clerk, and returned with a certified copy, a copy being also kept in the record. The registration, under authority of a clause of registration, is called a registration for execution, and is in effect a short cut to a judgment without the formality of an action, and the registration may take place after the death of the creditor as well as of the debtor. The other registration is usually called a registration for preservation, the object being merely safe custody; but the extract or copy kept in the register is allowed to be evidence in all cases except where there is an action of improbation to reduce the original deed for forgery. The general register is separate from that of deeds containing clauses of registration, and is applicable to all writs of which it is useful to preserve a copy.

Another class of registers has for its object publication to all the lieges, which is effected by allowing inspection to the public, and these writs are those connected with heritable rights, being used by all who lend money on land, or purchase land. There is under this class (1) a register of sasines—i.e., of the final deeds completing the title to property, and vesting it in the owner; (2), a register of entails—i.e., of deeds which perpetuate the enjoyment of land by a specified class of heirs; (3), a register of interdictions—i.e., by which a proprietor of heritage limits his own power of alienation; (4), a register of adjudications—i.e., transfers by operation of law; (5), a register of inhibitions—i.e., of diligence restraining an owner of land from alienating it to the prejudice of creditors; (6), a register of inventories, by which heirs limit their liability to the amount of their ancestors' assets. By the combined effect of these registers, the state of heritable property, as affected by incumbrances, is displayed to all parties who are interested in ascertaining that fact, and the practice has been found of great benefit to the landowners of Scotland. Besides the general registers for all Scotland, there were once local registers in every county and burgh for similar purposes; but since 1871 only indexes and abridgments are sent to each county, and the deeds themselves, except in burghs, must be registered in the general register house in Edinburgh. The general result of the Scotch registration system is, that deeds and all other writings may be registered for preservation either in the central register in Edinburgh, or in the burgh registers; that deeds containing clauses of registration with consent of execution, as well as protests of bills of exchange, may be registered for preservation and also for execution in the books of council and session, or in the registers of the subordinate courts; and that all deeds, instruments, and proceedings affecting heritable property must be registered, so that any one can ascertain the burdens affecting it, by inspecting the burgh register as to burgage property, and as regards all other property by inspecting the general register in Edinburgh, where the whole of the general and local deeds can be found concentrated. At the head of the management of these public registers is the lord clerk register, by whom and by his deputy and officers the details of registration are carried out. The general register house in Edinburgh, in which are collected all these records, was completed in 1787, a general principle of the management being, that the formation of the records is intrusted to one set of officers, and the safe custody of them to another set, so as to provide a better check on the whole process.

RE'GIUM DO'NUM (Lat. royal gift), an annual grant of public money formerly received by the Presbyterian ministers in Ireland. It began in 1672, when Charles II. gave £600 of secret-service money to be distributed annually among the Presbyterian clergy in Ireland, on hearing that they had been loyal to him, and had even suffered on his account. The grant was discontinued in the latter part of the reign of that monarch, as well as in the time of James II., but was renewed by William III. in 1690, who increased it to £1200 a year. It was further augmented in 1723 by George I., in consequence of the Presbyterians having supported the house of Brunswick; raised to £2,200 in 1784, and to £5,000 in 1792. The amount of the grant for 1863 was £39,746. The grant was at one time shared in by other dissenting ministers, but was latterly confined to the Presbyterian body. The propriety of receiving the regium donum was much disputed by those of the same persuasion in England and Scotland. The regium donum was withdrawn by the act of 1869, which came into force Jan. 1, 1871, disendowing the Irish Episcopal church.

RE'GIUS PROFESSOR, the name given to the professors in the English universities whose chairs were founded by Henry VIII. In the universities of Scotland, those professors are called regius professors the patronage of whose chairs is vested in the crown.

REGLET, a flat narrow molding rising equally on both sides. It is used to separate panels, and to form frets, etc.

REGNARD, Jean François, 1655–1709; b. Paris; visited Italy 1676–78, where he met the Eloise of his posthumous novel *La Provencale.* Taken prisoner by Algerine pirates, he was a captive in Constantinople for two years. He afterward traveled over the n. of Europe. As a dramatist his rank in France is second to that of Molière only. His best pieces are *Le Joueur*, which depicts the vice of gambling, to which he was himself addicted; and *Le Legataire Universel.* His *Les Ménechmes* is dedicated to Boileau, as a mark of the reconciliation which had been effected between them after a long literary controversy. Besides comedies, he wrote an opera, a tragedy, epistles, and satires.

REGNAULT, Henri Victor, a distinguished recent French chemist and physicist, was born at Aix-la-Chapelle in 1810. While still very young, he was left to provide for himself and his sister, came to Paris, and became a shopman in a bazaar. He made such good use of his scanty leisure, that he qualified himself for admission (in 1830) to the école polytechnique, and, after the two years' course, came out as a mining engineer. He became a professor in Lyon, whence, in 1840, he was recalled to Paris as a member of the academy of sciences, in consequence of some important discoveries in organic chemistry. Having filled chairs in the école polytechnique and the collége 'de France, he became, in 1854, director of the imperial porcelain manufactory at Sèvres.

He was distinguished for extreme skill and patience in experimental work, more than for brilliance or novelty in discovery; and devoted himself especially to the determination of important physical data, such as the laws of expansion of gases, the measurement of temperature, latent and specific heats, etc. His greatest work is that on the numerical data bearing on the working of steam-engines, for which the royal society of London awarded him their Rumford medal. He also received the Copley medal (1869) of the royal society, and was one of its foreign members. In addition to numerous papers in the *Annales de Chimie*, etc., he published a *Cours Elémentaire de Chimie* (4 vols., 14th ed. 1871). He died in Jan., 1878.

REGNAULT, Jean Baptiste, Baron, 1754–1829; b. Paris; visited Africa and America as a sailor, and afterward studied painting with Bardin. His "Alexander and Diogenes" won the grand medal in 1774. Among his most famous works are "Perseus and Andromeda," 1782; and "Cupid and Psyche," 1829.

REGRA'TING. See Engrossing.

REGULA, a band under a triglyph (q.v.) in the Doric style, or the bands between the canals of the triglyphs

REGULAR CANONS (Lat. *canonici regulares*, canons bound by rule), the name given, after the reform introduced into the system of cathedral clergy in the 11th c., to the members of those canonical bodies which adopted that reform. They were thus distinguished from the so-called "secular canons," who continued exempt from rule, and who are represented down to modern times by the canons, prebendaries, and other members of cathedral chapters, in those churches in which the full cathedral system of the Roman Catholic church is maintained. The rules of the regular canons being variously modified in different countries and ages, a variety of religious orders arose therefrom, Augustinians, Premonstratensians, etc. See Canons, Augustines.

REGULAR PLANE FIGURES are those surfaces whose perimeters are equilateral and equiangular polygons. They are named according to the number of sides which compose the perimeter, being triangles, squares, pentagons, hexagons, etc., according as they have 3, 4, 5, 6, etc., sides respectively; and to all except the *square* (q.v.) the prefix "regular" or "equilateral and equiangular" is applied, to distinguish them from other plane figures which have an equal number of sides, but have not all the sides and angles equal. Circles can be inscribed in and described about all regular figures. See Polygons. *Regular bodies, solids, or polyhedrons* are those solids whose sides are plane figures, all the plane figures being equal, similar, and regular. The number of such bodies is necessarily very limited; in fact no more than *five* such bodies are possible. They are the tetrahedron, hexahedron or *cube*, octahedron, dodecahedron, and icosahedron. The sides or faces of the first, third, and fifth of these solids are equilateral triangles; those of the second are squares; and those of the fourth are regular pentagons. From these 5 regular solids having been treated of, or described by Plato, they are generally known as the platonic bodies, or Plato's 5 solids.

REGULARS—REGULAR CLERGY (Lat. *regulares*, from *regula*, "persons bound by rule"), a name used to designate that portion of the clergy, in the Catholic church, who belong to the monastic orders or religious congregations, and thus live under an established rule, commonly including the three vows of poverty, chastity, and obedience. The name regular is employed in contradistinction to "secular," the term applied to the clergy who are employed in the ordinary parochial duties, or at least who are not withdrawn from liability to such duties, by being subject to any religious rules or constitutions. The name, therefore, comprises all friars, monks, regular canons, clerks of the missions, and, in general, all members of clerical congregations who live under an approved rule.

REGULATIONS, MILITARY AND NAVAL, are the official codes of rules for the guidance of officers in all the cases where uniformity of practice is requisite, and which cannot rightly be left to individual discretion. Regulations may be divided into 3 classes: viz., those affecting drill, discipline, and finance. Of the first class are such as cavalry regulations, infantry field manual, naval gun-drill, etc. Of the second are the mutiny act (q.v.), articles of war (q.v.), and queen's regulations (q.v.). The third class are represented by the war-office regulations, purveyors' regulations, explanatory directions for paymasters, navy paymasters' regulations, etc. All these are continually supplemented and altered by circulars.

REGULUS. See GOLDEN-CRESTED WREN.

REGULUS, a term in metallurgy, which is now used in a generic sense for metals in different stages of purity, but which still retain, to a greater or less extent, the impurities they contained in the state of ore. When, for example, the ore known as the sulphuret of copper is smelted, the product of the different furnaces through which it passes is called regulus until it is nearly pure copper. The name, which signifies "little king," was first given by the alchemists to the metal antimony, on account of its power to render gold brittle.

REGULUS, MARCUS ATILIUS, a favorite hero with the Roman writers, was consul for the first time 267 B.C., and for his successes against the Sallentini, obtained the honor of a triumph. Chosen consul a second time 256 B.C., he was sent along with his colleague L. Manlius Vulso at the head of a navy of 330 ships (with a land army on board) against the Carthaginians, it being the 9th year of the first Punic war, and encountering the enemy's fleet off Heraclea Minor, he totally defeated it. The Romans then landed near Clypea, where they established their headquarters, and ravaged the surrounding Carthaginian territory with fire and sword, but Manlius being recalled to Rome with one half of the land forces, Regulus was left to carry on the war with the remainder. For some time he was victorious in every encounter, but at last (255 B.C.) suffered a total defeat; 30,000 Romans were left dead on the field, about 2,000 fled and took shelter in Clypea, and Regulus, with 500 more, was taken prisoner. Regulus remained in captivity for five years, but when fresh reverses induced the Carthaginians to solicit peace, Regulus was released on parole and sent to Rome in company with the Punic envoys. The rest of his history is one of the most favorite of Roman tales. It is related, *con amore*, by the Roman poets and historians, as an instance and a model of the most supreme heroism, how Regulus at first refused to enter Rome since he was no longer a citizen; how, after this conscientious scruple was overcome, he declined to give his opinion in the senate, till that illustrious body laid upon him its commands to do so; how he then earnestly dissuaded them from agreeing to any of the Carthaginian proposals, even to an exchange of prisoners (though no reason appears why such an exchange should not have been effected); and how, after he had succeeded by his earnest appeals, in obtaining the rejection of the Carthaginian offers, he resisted all persuasions to break his parole, though conscious of the fate that awaited him, and, refusing even to see his family, returned with the ambassadors to Carthage, where the rulers, maddened by the failure of their schemes through his instrumentality, put him to death by the most horrible tortures. The common story is, that he was placed in a cask or chest stuck full of nails with the points projecting inward, and rolled about till he expired; and on the news of this event reaching Rome, retaliations equally atrocious were committed on two of the noblest Carthaginian prisoners. Unfortunately this noble instance of heroic patriotism and unflinching fortitude has not even been noticed by Polybius (about 200 B.C.), who details at great length the other achievements of Regulus; and Palmerius (Paulmier de Greutesmesnil) and Beaufort, two eminent historical critics, have adduced strong reasons for the story being merely invented for the purpose of excusing the horrible treatment of the captive Carthaginians. Niebuhr roundly declares it to be a forgery, and believes that Regulus died a natural death; though, excepting the silence of Polybius (which would be utterly unaccountable on the supposition of the mode of his death being the same or similar to what is stated in the common account), there appears to be no reason to doubt the statement in which all the other Roman historians agree, that he was put to death by the Carthaginians.

REGUR, the native name for the cotton-soil of India. It is a rich darkish loam, which has yielded a constant succession of crops—one of cotton, and two of corn—for 20 centuries. It covers extensive level tracts in the southern peninsula, varying from 3 to 20 ft. in thickness.

REÏ, REE, or REA, the nominal unit of account in Portugal and Brazil, but no longer existing as a coin; multiples of it, however, still form the authorized coinage in both countries. In Portugal, copper pieces of 5, 10, and 20 (*vintem* = 1d. nearly) reis, silver coins equivalent in value to 50, 100 (*testoon*), 200, 480 (*cruzado novo*), 500, and 1000 (*mil-*

reis) reis, and gold pieces of 1000, 2,000, 4,000 (*moeda douro*), 5,000, 6,400, 10,000 (gold crown), and 12,800 (*dobra*) reis, are the current coin of the realm; but accounts are kept almost exclusively in milreis and reis. The milrei in Brazil is, however, only equivalent to about 2s. 3d. sterling; while that of Portugal is fully twice this value, the exchange at present being about 4s. 7d. sterling. Gold and silver coins have almost disappeared in Brazil, the circulating medium consisting of notes of a milrei and upward, together with copper and bronze coins.

REICHENBACH, a flourishing manufacturing t. of Saxony, 11 m. s.w. of Zwickau. It contains several wool and cotton mills, stoneware and other factories; and produces extensively woolen fabrics, leather, nankeens, lace dresses, damask napkins, waistcoatings, and hosiery. The greater part of the machinery in the town and vicinity is driven by steam. Pop. '75, 14,620

REICHENBACH, a t. of Prussian Silesia, on the right bank of the Peilbach, romantically situated at the foot of the Eulen mountains, 46 m. by railway s.e. of Liegnitz. It contains 6 cotton factories, and carries on linen and woolen manufactures, yarn bleaching, dyeing, and printing. Pop. '71, 6,938; '75, 7,267.

REICHENBACH, KARL, Baron von, a German naturalist and technologist, was b. at Stuttgart, the capital of Würtemberg, Feb. 12, 1788, and educated at Tübingen, where he received the degree of PH.D. Soon after he conceived the project of founding a new German state in the South sea, but his plans were watched by the French authorities, and being suspected to have some hidden political significance, their author was arrested and imprisoned for some time in the fortress of Hohenasperg. On his release he turned his attention to the natural sciences, and their application to the industrial arts, visiting the principal manufactories of Germany and France, and on his return he established at Villingen and Hausach kilns for the production of wood-charcoal. In 1821, in connection with Hugh count of Salm, he commenced a number of manufactories of different kinds at Blansko in Moravia, which were carried on under his own superintendence. Reichenbach's management was so economical and effective, that the concern soon became extremely profitable; and Reichenbach, after a few years, was the possessor of a handsome fortune, which he invested in the purchase of large estates, including the château of Reisenberg, where he kept his magnificent collection of meteorites; he was about the same time created a baron by the king of Würtemberg. Reichenbach's position as manager of the works at Blansko afforded him valuable opportunities, which were not neglected, for scientific investigation, and the numerous new facts thus brought to light have been of great value to science and art. From the nature of the works, the objects which chiefly presented themselves to his investigation were the compound products of the distillation of organic substances, and by careful analysis he succeeded in bringing to light a number of compounds of carbon and hydrogen not previously known. Among these were creosote (1833) and paraffine (q.v.). In later years he lanched out into speculations of a wholly different character. Studying with enthusiasm the subject of animal magnetism, he discovered, as he thought, a new force in nature. See OD. His chief literary works are: *Geologische Mittheilungen aus Mähren* (Vienna, 1834), the first geological monograph published in Austria; *Physikalisch-physiologische Untersuchungen über die dynamide des Magnetismus und der Electricität, und ihre Beziehungen mit der Lebenskraft* (Brunswick, 1847–49); several other works on "odic force," published at Stuttgart between 1852 and 1858; several papers in the *Neues Jahrbuch der Chemie und Physik; Kohlerglaube und Afterwissenschaft* (1856), in reply to a work of Karl Vogt; *Aphorismen über Sensibilitat und Od* (1866); *Die Odische Lohe* (1867). Reichenbach died at Leipsic, Jan. 19, 1869.

REICHENBERG, after Prague the largest t. in the kingdom of Bohemia, stands in the middle of the most populous and industrious district of the Austrian monarchy, in a romantic valley on the Neisse, 52 m. n.n.e. of Prague. Linen, cotton, and woolen fabrics are manufactured extensively, as well as fire-arms, hats, leather, shoes, gold and silver wares, musical instruments, etc. During the Austro-Prussian war of 1866 Prince Frederick Charles had his head-quarters at Reichenberg. Pop. '69, 22,394.

REICHENHALL, a small t. of Bavaria, on the Saal, 8 m. s.w. of Salzburg. In was almost wholly consumed by fire in 1834, and has been handsomely rebuilt since that time. It is the center of the Bavarian salt-works, and in the manufacture of salt, its inhabitants—'71, 3,312 in number—are for the most part employed. Of its 18 salt-springs, which burst forth about 50 ft. below the surface of the ground, and to which a spacious shaft has been sunk, some are so strong in the brine as to be fit for boiling at once; but generally speaking, they are subjected to a preliminary evaporating process. The strongest and most abundant spring, containing 24 per cent of salt, and yielding 8,300 cubic ft. of water every 24 hours, is perhaps the most copious salt-spring in the world. From it alone about 200,000 cwts. of salt are obtained annually. A brine conduit, 60 m. in length, conveys the water of salt-springs from Berchtesgaden, through Reichenhall, over mountains nearly 2,000 ft. high, to Traunstein and Rosenheim, in the vicinity of which abundant timber for fuel is procurable.

REICHSTADT, NAPOLEON FRANÇOIS CHARLES JOSEPH, Duke of, described by the Bonapartists as NAPOLEON II., was the son of the first Napoleon by Maria Louisa of

Austria, and was born at Paris, Mar. 20, 1811. His father's joy at his birth was unbounded. "*C'est un roi de Rome,*" he cried to the crowd of congratulators who pressed into his apartments on hearing the news. The infant prince was baptized on June 9, in the cathedral of Notre Dame, by cardinal Fesch. After the reverses of 1814, Napoleon, it will be remembered, abdicated in favor of his son, but the senate took no notice of Napoleon II., and called Louis XVIII. to occupy the French throne; whereupon Maria Louisa and her child removed to the palace of Schönbrunn, near Vienna, where they remained till the treaty of Vienna had re-arranged the affairs of Europe. Maria Louisa then proceeded to take possession of the sovereign duchy of Parma, which had been conferred upon her, while her son continued to reside at the Austrian court with his grandfather Franz I., who was much attached to him. By an imperial patent, dated July 22, 1818, he was created duke of Reichstadt, with the rank of an Austrian prince, and received a liberal education, but never enjoyed robust health, nor exhibited a vigorous intelligence. At the July revolution in 1830 his name was mentioned as a candidate for the French throne, and Talleyrand, it is even believed, proceeded to Vienna for the purpose of advocating his cause, but was coldly received, and the project dropped. Destiny had indeed determined otherwise. The constitution of the poor youth was utterly undermined by laryngeal phthisis, and July 22, 1832, he expired at Shönbrunn. His last words, addressed to his mother, were very touching as an expression of almost childish despair, "*Ich gehe unter, meine Mutter, meine Mutter!*" He was interred with magnificent pomp in the imperial tomb at Vienna.

REID, Mayne, b. Ireland 1818; educated for the church, but the thirst for adventure induced him to set out for Mexico. In 1838 he visited New Orleans, and made several hunting and trading excursions among the Indians, gaining that knowledge of scenery, manners, and characteristics which he has since used to advantage in his *Scalp-Hunters, White Chief,* and many other romances. He devoted five years to travel in the United States; in 1845 obtained a commission, and served with distinction in the Mexican war. While in this country he contributed largely to the magazines, and established an unsuccessful periodical called *Onward.* In 1849 he organized a body of men in New York, to proceed to Hungary, to aid in the struggle for independence, but on reaching Paris he received the news of the total failure of the Hungarian insurrection. Capt. Reid has since lived in England, where he has devoted himself to literature, and has started several periodicals. Among his many works are *The Rifle Rangers; Desert Home, or Family Robinson; The Boy Hunters; The War-Trail; and Gwen Wynn, a romance of the Wye.*

REID, Thomas, was b. April 26, 1710, at Strachan, a country parish in Kincardineshire, where his father was minister. His mother belonged to the well-known family of the Gregories (q.v.). Reid began his education at the parish-school of Kincardine, and at the age of 12 he became a student of Marischal college in Aberdeen. His master in philosophy was Dr. G. Turnbull, one of the earliest representatives of the properly Scottish school. He took his degree of M.A. in 1726, and continued to reside in Aberdeen as college librarian, his chief studies being mathematics and the philosophy of Newton. In 1736 he left Aberdeen, and went, in company with a friend, to England, where he was introduced to the most distinguished men in Oxford, Cambridge, and London. In the following year he was presented by the senatus of King's college to the parish-church of New Machar in Aberdeenshire. The parishioners were bitterly opposed to his appointment, but his conduct and manner gradually won them over. It is said that, from distrust of his powers, instead of composing for the pulpit himself, he preached the sermons of the English divines Tillotson and Evans. In 1740 he was married to a cousin of his own, who greatly aided him in the work of his parish. In 1739 Hume's *Treatise on Human Nature* appeared; the perusal of which gave the impulse that determined his future philosophical career. He had fully adopted the idealism of Berkeley, but was now revolted by the conclusions drawn from it by Hume, and in consequence was led to seek a new foundation for the common notions as to a material world. In 1784 he contributed to the royal society of London a short essay on *Quantity,* occasioned by what he considered an abusive application, by Hutcheson, of the forms of mathematical reasoning to ethics. In 1752 he was appointed one of the professors of philosophy in King's college, Aberdeen, the senatus being the patrons of the chair. Here he followed the established course of teaching in three successive years to the same students, mathematics, natural philosophy, and moral philosophy. He took an active part in all the business of the university. He was also the founder of a literary society in Aberdeen, which enrolled among its members, Campbell, Beattie, Gerrard, and other men of ability; to this society he submitted his first draft of the *Inquiry into the Human Mind.* In 1768 he was chosen to succeed Adam Smith as professor of moral philosophy in the university of Glasgow. He was now rescued from the necessity of teaching physical science, and devoted himself thenceforth to metaphysical and mental speculations. In 1764 he published his *Inquiry.* His thirst for general science never left him; at the age of 55, he attended Black's lectures on heat. He continued in the duties of his chair till 1781, when he retired to devote his remaining strength to the publication of his works on the mind. In 1785 the *Philosophy of the Intellectual Powers* appeared; and in 1788 the *Active Powers.* These treatises must always be looked upon as constituting the first complete and systematic work on the science of the human mind. In 1774 he had contributed his account of Aristotle's logic to lord Kames's *Sketches*. The publication of the *Active Powers* was the close of his career as an author, although to the end of his life he kept up his bodily and mental vigor, and his interest in science. His only surviving daughter had married the son of Gershom Carmichael (the real founder of the Scottish school of philosophy); she it was that, after the death of his wife, in 1792, cared for him in his last years. He was taken ill suddenly in the autumn of 1796, and died Oct. 7. He was under the middle size, but had great muscular stength, and was addicted to exercise in the open air.

Reid had many points of resemblance to his great contemporary Kant. Both were occupied up to middle life with mathematical and physical studies; both were roused to metaphysical research by Hume, and each became in his own country the chief of a school whose aim was to deliver philosophy from skepticism, and to do so by resting finally on principles of intuitive, or *a-priori* origin.

Reid's refutation of Berkeley, notwithstanding the powerful support of Hamilton, is now considered by many to be a failure. His own account of the motives that led him to abandon idealism proves that he completely misconceived the real drift of that famous speculation.

REID, WHITELAW, b. Ohio, 1837; graduated in 1856 at Miami university; was superintendent of public schools in South Charleston, Ohio, and then editor of the Xenia *News*, which he purchased about 1858, and which was one of the earliest newspapers in the west to advocate Mr. Lincoln for the presidency. In the winter of 1860–61 Mr. Reid was in Columbus, Ohio, as a correspondent, and next became city editor of the Cincinnati *Gazette*, and acted as war-correspondent of that paper in 1861, his vivid descriptions of battles which he witnessed gaining for him a wide reputation as a writer of remarkable brilliancy. He was attached to the staff of gen. Rosecrans, was present at the battle of Pittsburg Landing, and in the spring of 1862 was sent to Washington by the *Gazette*. He was appointed librarian to the house of representatives, was present at, and wrote a graphic description of, the battle of Gettysburg, and had by this time become recognized as one among the few leading war-correspondents of any nation. In 1865 he traveled through the south with hon. Salmon P. Chase, and described the condition of that section in his *After the War*. He was for two years a cotton-planter in Alabama and Louisiana, but in 1868 became one of the principal editors of the Cincinnati *Gazette*. He had already (in 1862) been offered by Mr. Greeley a position on the editorial staff of the New York *Tribune;* and this offer being renewed in 1869, it was accepted, and Mr. Reid became managing editor of that journal. He was editor-in-chief while Mr. Greeley was running for the presidency in 1872, and on the death of the latter became proprietor of the *Tribune*, a position which he still occupies. Mr. Reid has become prominent in a charitable movement originating with some benevolent person whose name has not been made public; and, as his almoner, has expended large sums and given much time and labor in sending New York street-boys to the west, and placing them in positions there, among the farming population. In dispensing this charity he has been remarkably successful. He should also be credited with the accomplishment of the difficult task of sustaining the *Tribune* at a high point of success, in the face of more than ordinary obstacles; and particularly that of the loss of Mr. Greeley, who was identified with that paper from its foundation, and whose relations to the American public were calculated to make his death ruinous to its future career.

REID, Sir WILLIAM, 1791–1858; b. Scotland; entered the army, served in the peninsula in the war of 1812, at the battle of Waterloo, and in the attack on Algiers in 1816. He was governor of Bermuda 1838–46, and of the Windward islands 1846–48, when he returned to England, and became engineer in command at Woolwich. He was chairman of the executive committee of the great exhibition of 1851, governor of Malta 1851–58, and was appointed maj.gen. in 1856. He wrote *An Attempt to Develop the Law of Storms*, etc., 1838; and *The Progress of the Development of the Law of Storms*, 1849.

REIGATE, a municipal borough and thriving market t. of Surrey, pleasantly situated at the southern base of the North Downs, 23 m. s. of London by the South-eastern railway. From very early times it was considered a place of strength; and after the conquest it was granted to the earls of Warrenne. Of the castle built by these earls, only very slight vestiges remain; but beneath the site are several large vaults or caverns, excavated in the sandstone not earlier than the 13th century. The church is in various styles of architecture—the oldest portions dating from the 12th century. Under its chancel is buried Charles Howard, earl of Effingham, Elizabeth's lord high admiral, and the conqueror of the Spanish armada. Reigate formerly returned a member to parliament, but was disfranchised in 1867. Pop. '61, 9,975; '71, 15,916.

REIGN OF TERROR, the name given to that period in the history of France when the revolutionary government, under the guidance of Maximilien Robespierre, supported itself by the pure operation of terror, exterminating with the guillotine all the enemies, or supposed enemies, of the democratic dictatorship. In the year 1793 the convention vested the government in a "committee of public safety," a body belonging to the party of the Mountain, and of which Robespierre, Couthon, and St. Just became the triumvirate. This committee, to which every other authority in the country was subjected, deliberated in secret, and the convention sanctioned all its decrees. Louis XVI. had already been brought to the scaffold; and on Oct. 16 his queen, Marie Antoinette, after being subjected to every possible indignity, was beheaded; the princess Elizabeth sharing the same fate on May 10, 1794. The execution of the Girondists (q.v.) followed, and that of the duke of Orleans. The guillotine became the only instrument of government: a look or a gesture might excite suspicion, and suspicion was death. The calendar was remodeled, and all religious rites suppressed. When the power of the committee had attained its climax, a decree was passed abrogating every delay or usage calculated to protect an accused person; but from that moment a reaction began. A section of the mountain party were satiated with blood, and had become impatient of the control of Robespierre. On July 28, 1794, he was denounced in the convention for his barbarities, and his death (see ROBESPIERRE) brought to a close this sanguinary era in French history.

REI'KIAVIK. See ICELAND.

RÉ ILE DE (*Rex insula*) is a small island on the coast of the French department of Charente Inférieure, opposite the city of La Rochelle, from which it is separated by the Pertuis Breton. It is about 18 m. long, and 4 m. broad. It contains 5,600 inhabitants, most of whom are engaged in fishing. The island is skirted by high cliffs, and strongly fortified by four forts. It has several good harbors and two light-houses; but there are neither springs nor wood on the island, and next to fishing, the culture of the vine constitutes the chief occupation of the islanders. Brandy made from the wines of Ré, and sea-salt, are the principal articles of the trade of the island. St. Martin, which ranks as the capital of Ré, is a well-fortified little town with a good harbor, is the chief seat of the trade, and has (1872) 1916 inhabitants. Oyster-farming has of late become an important branch of industry. See OYSTER.

REIMARUS, HERMANN SAMUEL, a German philologist of high eminence, was b. in 1694 at Hamburg, where his father was professor at the Johanneum gymnasium. He visited the universities at Jena and Wittenberg, traveled afterward in Holland and England, and was, on his return, elected rector at Wismar, and subsequently professor of Hebrew and mathematics at the gymnasium of Hamburg. He died there in 1765. He is the author of the so-called *Wolfenbüttelsche Fragmente eines Unbekannten*, first published by Lessing in his *Beiträge zur Geschichte und Literatur aus den Schätzen der Wolfenbüttelschen Bibliothek.* These *Fragmente*, up to that time only known in MS. by a few of Reimarus's most intimate friends, produced the profoundest sensation throughout Germany: since in them, the author, in the boldest and most trenchant manner, denied the supernatural origin of Christianity. Another work, in the same direction, is his *Vornehmste Wahrheiten der Natürlichen Religion;* of a miscellaneous character are his *Primitiæ Wismariensia; De Vita Fabricii; Dissertatio de Assessoribus Synedrii Magni;* etc. His edition of *Dio Cassius* is one of the most valuable contributions to classical philology.

REINDEER, *Cervus tarandus* or *Tarandus rangifer*, a species of deer (q.v.), a native chiefly of the arctic regions; by far the most valuable and important of all the species of deer, and the only one which has been thoroughly domesticated and brought into service by man. It is found wild in Europe, Asia, and America, in Spitzbergen, and in Greenland. It is not, however, a native of Iceland, but was introduced into that island by governor Thodal in 1770, and soon became thoroughly naturalized; great herds now roaming over the wildest parts of the interior, but approached with difficulty by the hunter, and of little value to the inhabitants. It is not there known as a domestic animal. The reindeer attains its greatest size in the arctic regions; and in western Europe it is not found very far to the s. of the arctic circle; but in Siberia and in America its range extends much further to the s., almost to the latitude of Quebec in America; and in the w. of Asia along the whole chain of the Ural mountains, and even to the s. of Astrakhan, almost to the Caucasus.

The wild reindeer of Lapland is almost equal in size to the stag, but there are great differences of size in different districts, the largest size being generally attained in very polar regions. The domesticated reindeer is never so large as the largest wild ones; but the domesticated reindeer of Siberia is, like the wild one, much larger than that of Lapland. The reindeer is very inferior in gracefulness to the stag, and indeed to most species of deer, being of a rather heavy appearance, with comparatively short and stout limbs, the withers much elevated as in the elk, and the neck carried almost straight forward. The tail is very short. There is little or no mane, but the hair of the lower parts of the neck is very long and shaggy. Both sexes have large horns, those of the male being larger and often more than 4 ft. long. They are slender and cylindrical almost to the tip in young animals, but in old ones become palmated there, although still slender and cylindrical at the base; they are more or less branched, and from the base spring one or two branches, comparatively short, but also in old animals much palmated, so that the armature of the head is of a very peculiar appearance. The reindeer is said to use its horns to remove the snow from the lichens which form great part of its winter food; it also scrapes up the snow with its feet and turns it up with its snout; and by a beautiful provision of nature the feet, forehead, and nose are protected by a remarkably hard skin. The reindeer is gregarious, partially migratory—its migrations, however, not being regulated by climate, but by the facility of obtaining food. To the Laplander the reindeer constitutes the chief part of his wealth; and many Laplanders possess herds of 2,000 and upward, which they feed chiefly in the mountainous tracts in summer, and in the lower grounds in winter. The flesh is excellent, as is also the milk, which is much used. The skins are used for clothing, tents, and bedding. The hard skin of the face and feet is much valued by the Laplanders for making shoes. The reindeer is also extremely valuable as a beast of draught, for which purpose it is harnessed to sledges. It is capable of maintaining a speed of 9 or 10 m. an hour for a long time, and can easily draw a weight of almost 200 lbs. besides the sledge. It is much employed for this purpose in Siberia as well as in Lapland; but in America it is merely an object of chase, valued for its flesh, fat, and hide. Among other methods resorted to by the Esquimaux and other Indians for its capture is that of making pits in the snow, covered with a slab of ice, which revolves on its own center when the reindeer sets foot on it. The flesh and fat are made into pemmican (q.v.), besides being used in a fresh state. A very thick layer of fat lies under the skin of the back of the male. The American reindeer is called the CARIBOU, and is sometimes regarded as a distinct variety, but the differences are very slight. Although the reindeer has been found to live for years when brought to Britain, the climate does not seem suitable to it.

The reindeer suffers grievously during summer from the attacks of various kinds of insects, and particularly of a species of bot (q.v.), which is sometimes not merely tormenting but destructive.

REINDEER MOSS, *Cenomyce rangiferina* or *Cladonia rangiferina*, a lichen of great importance to the Laplanders and other inhabitants of the northernmost regions of Europe and Asia, as forming the chief winter food of the reindeer. It is found in almost all parts of the world, but is most abundant and luxuriant in the arctic regions. It is common in Britain, growing in moors and on mountains. It covers extensive tracts in Lapland and other very northern countries, making them even in summer as white as snow, and often thus occupies the ground in pine forests. When pine forests are destroyed by fire it soon springs up in its greatest luxuriance. It is a very variable plant, but always consists of a much-branched erect cylindrical tubular thallus, with small perforations in the axils. It attains a height of 2 in. and upward. The branches of plants which grow together usually mix very intricately into one mass. The importance of this lichen was first brought into notice by Linnæus in a beautiful passage of his *Flora Lapponica*. The reindeer reach it by scraping with their feet, even when it is covered with very deep snow. It is capable of being used for human food, and was recommended for this purpose in times of dearth by an edict of Gustavus III. of Sweden. Its taste is pleasant, although attended with a slight pungency or acridity. It is generally boiled in reindeer milk. Its nutritious qualities depend chiefly on the lichenin (q.v.) which it contains.

REINFORCE, FIRST and SECOND, in guns, are the two sections of the length which come next the breech. The gun is made thicker at these parts, so as to resist more effectually the explosive action of the powder. The thickness of metal is less at the second reinforce than at the first, the powder being considered to have already exerted its greatest disruptive force. This conclusion is, however, open to dispute.

REINKENS, JOSEPH HUBERT, b. at Burtscheid, near Aix-la-Chapelle, in 1821; studied theology at Bonn; ordained priest of the Roman Catholic church; was cathedral preacher 1852–53, and in 1857 appointed professor at Breslau. In 1870 he united with Döllinger in the Old Catholic movement; was suspended by the bishop of Breslau, and the students were forbidden to attend his lectures. In 1873 he was consecrated bishop at Rotterdam by the Jansenist bishop of Deventer. He soon took the oath of allegiance to the government, and was recognized by the emperor as a Catholic bishop.. He has published several theological and philosophical works.

REIS EFFENDI, a title formerly given to an officer of state in the Ottoman empire. He was the chancellor of the empire, and minister of foreign affairs. His duty in the first-mentioned capacity was to confer with the grand vizier regarding the orders and instructions to be sent to the different provinces, and regarding the proper decision on any subject affecting the empire, whether internal or external; and in the latter capacity he had the sole and exclusive charge of the relations of the Porte with foreign courts.

REIS'SIGER, KARL GOTTLIEB, 1798–1859; b. Wittemberg, Germany; educated at Leipsic, and studied music at Vienna, Munich, and other cities. The greater part of his life was spent at Dresden, where he was first director of music, and later chapel master. He published a melodrama and several operas, but is best known by his oratorio *David*, and by his songs.

REJOINDER, in English law, means the pleading of a defendant in answer to a plaintiff's replication. The order of pleading is declaration, plea, replication, rejoinder, surrejoinder, rebutter, surrebutter, etc., each party alternately delivering one of these pleadings.

RELAPSING FEVER is one of the three great species of continued fever common in Great Britain, the two others being typhus and typhoid. Although the disease has been accurately described by several physicians during the last century (since 1739), its present name was given to it only about 1850 by Dr. Jenner. It had previously been vaguely known under the various names of *five-day fever*, *seven-day fever*, *mild yellow fever*, *short fever*, *short relapsing fever*, etc., and has often been confounded with common continued fever. It has attracted special notice since 1843–44, when there was prevalent in Scotland "an epidemic fever characterized by the suddenness of its onset, its wide diffusion, its short duration, and its small mortality; by its proneness to relapses, by the frequent occurrence of petechiæ, of something like black vomit, and of yellowness of the skin; by the absence of intestinal ulcers; and by profuse sweatings, whereby the fever seemed to be solved." This fever was supposed at the time by Alison and other eminent physicians who described it, to have been a new and hitherto unknown pestilence; but Jenner's subsequent researches showed, as has been already mentioned, that in this respect they were in error, epidemics of this kind having previously occurred in Scotland or Ireland (or both simultaneously) in 1736, 1739–41, 1800–01, and 1816–20.

Relapsing fever usually begins suddenly with rigors, a sense of chilliness and frontal headache. Febrile reaction soon sets in; the tongue is coated with a thick moist whitish fur; and the skin is often so yellow as to approach to jaundice (a phenomenon that never occurs in typhus or typhoid fever). By the fifth or sixth day there is usually delirium. After the above-described symptoms have lasted for a period varying from five to eight days, generally on the seventh day, a sudden change takes place. This change commences with a copious perspiration, which is followed by a rapid falling of the pulse to its healthy rate (or even lower), and the patient appears nearly well. But from the fifth to the eighth day of this seeming convalescence a sudden relapse occurs, and all the primary symptoms return; these run a rather shorter course than before, and again terminate in sweating and in a second convalescence, which is in most cases permanent. The relapse sometimes, however, occurs three or even four times.

Death is a rare termination of relapsing fever, and when it does occur it is usually before the seventh day of the disease. No special anatomical lesion is observed in the bodies of those who succumb to this disease, but enlargement of the spleen is by no means uncommon.

The treatment to be adopted is simple. The bowels should be opened at the commencement of the attack by calomel and rhubarb, and, if necessary, kept open subsequently with castor oil or saline aperients. The headache must be encountered by leeches or cupping if the patient is robust, and by blisters or dry cupping if he cannot bear the loss of blood. The vomiting is often hard to check: if effervescing draughts fail, it may sometimes be combated by calomel and opium combined in pills.

Its cause is unknown, but it mainly attacks the poor and the ill-housed and ill-fed. Its poison appears to be a specific kind; the phenomena of the fever are very different from those of typhus and typhoid fevers; and persons recovering from these diseases may catch, by contagion, this disease, while patients convalescent from this fever may take typhus or typhoid fever. It has been supposed by some physicians to be allied to yellow fever, but it seems more nearly to resemble some form of remittent fever (q.v.), on account of the repetition of the rigors after a regular daily period of from two or three days.

RELATIVE KEYS, in music, the keys most nearly related to any key whose scales have the greater number of their notes in common with it. The keys which are most nearly related to a major key, taken as principal, and into which it may most easily pass, are its *dominant*, or fifth above; its *subdominant*, or fifth below—each of which differs from it by only one sharp or one flat—and its *relative minor* key; that is, the key which has the same signature, is in its descending scale the same, the ascending scale differing by two notes. In the same way, the keys most nearly related to a minor key are its *dominant* and *subdominant* and its *relative major*. Thus the relative keys of C major, as principal key, are G major, F major, and A minor; and the relative keys of A minor are E minor, D minor, and C major. A more remote degree of relationship subsists between a major key and the dominant and subdominant of its relative minor, or between a minor key and the dominant and subdominant of its relative major. A major key is also closely connected with its tonic minor, or the minor key of the same tonic, as the two keys have the tonic, dominant, and subdominant in common.

RELATIVE PRONOUNS differ from personal and other pronouns (q.v.) in this, that, besides standing for nouns, they at the same time have the power of conjunctions. They join sentences or clauses by *relating*, or referring back directly, to something just named. The relatives in English are *who*, *which*, and *that*. *What* is used for *that which*, thus embracing both relative and antecedent. In many cases *who* or *which* can be resolved into a conjunction and a personal pronoun. Ex. "At last the surgeon was called in, *who* (=*and he*) straightway amputated the limb." "Why consult Charles, who (=*for* or *since he*) knows nothing of the matter?" "Ahab seized the vineyard of Naboth, *which* (= *although—it*) he had no title to." In cases where they are not thus resolvable, they introduce sentences or clauses to limit nouns, the relative clause serving the purpose of an adjective. Ex. "He picked out all the men *who had blue eyes*" (= *the blue-eyed*). "The house *which stands* (= *situated*) half-way up the hill is the most cheerful."

Who is employed when the reference is to persons, and *which* when it is to inferior animals or things. *That* is applied to both persons and things; but it does not follow that it may be used at pleasure instead of *who* or *which*. Whenever a *who* or *which* is resolvable as above described, the substitution of *that* would alter the meaning; in the last, e.g., of the three examples given, it would make the sentence declare that Ahab seized the particular one of Naboth's vineyards to which he had not a title; implying that he had a title to some other vineyard or vineyards of Naboth. It is only when the purpose of the relative clause is to limit or define the thing meant that *that* is ever applied; and for this purpose its use is in general preferable to that of *who* or *which*. It is easier and more idiomatic to say, "All the men that had blue eyes," than "All the men *who*," etc.; and who would think of saying, "This is the house *which* Jack built"? Besides, *that* so employed often avoids ambiguities that would attend *who* or *which*. Ex. "His conduct surprised his English friends, *who* had not known him long." This may mean either that his English friends generally were surprised, for the reason that they had not known him long; or that only a portion of them—those, namely, that had not known him long—were offended. If the latter is the meaning intended, it would remove all ambiguity to write, "His English friends *that* had not known him long."

The use of the demonstrative *that* as a relative is common to the Teutonic languages, but is unknown in Greek and Latin and in the Romanic languages. The relatives proper (and the many derivatives and compounds formed from them) in all the allied languages begin with *k* or an equivalent of *k* (*qv, hv, hw=wh, w, h*). Sans. *kas*, Gr. *kōs* or *pōs* (how), Lat. *quis, qui*, Pol. *kto*, Goth. *hvas*, Ger. *wer*, Dan. *hvi* (pron. *vi*), Eng. *who, how*, Fr. *qui*, It. *chi*.

The relatives proper are also used (sometimes with a slight variation of form) to ask questions, when they are called interrogatives.

RELATIVE RANK, in the army and navy, signifies the precedence which certain noncombatant officers and others are entitled to take among their combatant brethren; for instance, a controller has the relative rank of maj.gen., a naval surgeon that of a naval lieut, etc. Relative rank carries with it all precedence and advantages attaching to the military rank with which it corresponds, and regulates rates of lodging-money, number of servants, rations of fuel and light (or allowances in their stead), detention, and prize-money. Relative rank does not entitle the holder to salutes from ships or fortresses, nor to the turning out of guards, and, of course, it does not confer any right to command.

The relative rank of the several civil departments is stated under their respective headings; see MEDICAL DEPARTMENT, PURVEYORS, etc. It only remains to show the relative rank of the army and navy:

Navy.	*Army.*
Admiral of the fleet	Field marshal.*
Admirals	Generals.*
Vice-admirals	Lieutenant-generals.*
Rear admirals	Major-generals.*
Captains of the fleet, Commodores, 1st and 2d class	Brigadier-generals.*
Captains over three years' service	Colonels.*
Captains under three years' service	Lieutenant-colonels.*
Commanders	Lieutenant-colonels.†
Lieutenants of 8 years' standing	Majors.*
Lieutenants under 8 years' standing	Captains.*
Sub-lieutenants	Lieutenants.*
Midshipmen.	Sub-lieutenants.*

RELATIVE RANK (*ante*). In the U. S. army and navy the relative rank of officers is as follows:

Army.	*Navy.*
Second-lieutenant	Ensign.
First-lieutenant	Master.
Captain	Lieutenant.
Major	Lieutenant-commander.
Lieutenant-colonel	Commander.
Colonel	Captain.
Brigadier-general	Commodore
Major-general	Rear-admiral.
Lieutenant-general	Vice-admiral.
General	Admiral.

The officers in the marine corps rank with those bearing the same titles in the army.

RELEASE, in English law, is a discharge of some interest in land, or of some legal right. Thus, where one who is the owner of land gives or transfers his right to another who has some prior estate in possession, the deed by which this is done is a release.

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* According to date of commission

† Junior of the rank.

Formerly it was usual for A to give a lease of land to B, and next day to give a release conveying the rest of the estate to B. The term "release" is also used as a discharge of all demands or rights of action in reference to a particular matter.

RELEASE (*ante*) may be express or implied, as it is made in direct form or arises from an act of the creditor or owner. When the releasor performs some act which the law presumes to be a release to other parties, it is called a release by operation of the law. In making a general release the words "claims or demands" are usually employed. But even when general words are used, the court will often limit their application in accordance with the circumstances giving rise to the release. Where a witness is rendered incompetent to testify by a personal interest in the property in dispute, a release from the proper party will make him competent. In real-estate law the terms used in a release are usually "remised, released, and forever quit-claimed." Five kinds of releases in real-estate law are given: those which pass the estate, those which pass the right, as from a disseizee to a disseizor; those which release by enlargement, as where a landlord gives his reversionary interest to a tenant in possession; release by way of extinguishment, as of an easement; and release by feoffment and entry, where one of two disseizors obtains a release from the disseizee and thereby gains the estate in fee to the exclusion of the other.

RELEVANCY, in Scotch law, means the condition of a plea which is well founded in point of law, provided it be true in fact. An objection to the relevancy corresponds in many respects to a demurrer in English.

RELICS (Gr. *leipsana*, Lat. *reliquiæ*, remains), the name given in theological and historical nomenclature to what may be in general described as the personal memorials of those among the dead who have been distinguished during life by eminent qualities, especially by sanctity or by remarkable religious services. Under the same name are classed certain objects which are believed to be memorials of the life of our Lord upon earth, and especially of his passion and death. Such memorials of the distinguished dead have at all times and in all states of society, however rude, been held in honor among men. But the question as to relics is chiefly important in relation to Christian history, in which the name is restricted to a single class of memorials, viz., to objects which derive their value from their connection with our Lord and with the saints; as, for example, fragments of our Lord's cross or crown of thorns, portions of the dust, the bones, the blood, the instruments of torture, the chains, etc., of the martyrs, the mortal remains, the clothes, the books, and other objects of personal use of the other saints, and even objects to which a certain indirect sacred interest is given by their being brought into contact with the direct memorials of the distinguished dead, as by their being placed on the tombs of the martyrs, touched with the relics, or blessed at the shrine or sanctuary of the saints, etc. In all such cases the motive of religious honor, however differently it arises, is precisely the same, viz., the association of the object which is honored with the personage whose virtues or services are the subject of grateful veneration. The merits of relics, in their theological aspect, are beyond the scope of this publication. We shall confine ourselves to an outline of the history of the veneration of relics, and to an explanation of the conflicting views of the rival Christian communions on the subject.

The very earliest monuments of Christian history contain evidences of the deep and reverential affection with which martyrs of the faith, their mortal remains, and everything connected with their martyrdom, were regarded by their fellow-Christians, and for which Catholics profess to find warrant in many passages of the Old and of the New Testament, as Ex. xiii. 19; Deut. xxxiv. 6; 2 Kings xiii. 21, and xxiii. 16–18; Isaiah xi. 10; Matt. ix. 20–22; Acts v. 12–16, and xix. 11, 12. The contemporary letter of the church of Smyrna attests this plainly as to the martyrdom of Polycarp; Pontian's *Life of Cyprian* tells of their stealing the martyr's body, and carrying it away by night in holy triumph with lights and torches. At an early period, too, miracles are described as connected with relics. Thus Ambrose (Ep. xxii. 1, 2) tells of a blind man's sight restored by his touching the bodies of the martyrs Gervasius and Protasius; and similar wonders are detailed by Gregory Nazianzen (*Orat.* xviii.), Chrysostom (*In S. Ignatium*, n. 5), Leo the great (*Serm.* iv. 4); insomuch that the possession of relics of the martyrs, and even the occasional touching of them, was regarded as a special happiness (Gregory Naz. *Orat. in S. Theodorum*), and that not merely individuals, but, according to Theodoret the historian, even cities were content to share with each other portions of the sacred treasure (Theodoret, *Græc. Affectionum Curatio*, disp. viii.). Connected with this feeling, too, is found a belief of a certain sacred efficacy in the presence or the touch of the relics, and especially there is ascribed by Chrysostom, Basil, Theodoret, and other fathers, to prayers offered before the relics, a virtue in dispelling or warding off sickness, diabolical machinations, and other evils. Hence we find that altars were erected over the tombs of the martyrs, or at least that relics were invariably placed on the altars, wherever erected, insomuch that the Trullan council ordered the demolition of all altars in which no relics had been deposited. Far more sacred than the relics of martyrs was the cross of our Lord, which was believed to have been discovered at Jerusalem by Helena (q.v.), mother of the emperor Constantine. Minute portions of the wood were distributed to the principal churches; and Cyril of Jerusalum, within less than a century after the discovery of the cross, describes the precious wood as dispersed throughout the world. It must be added, too, that even at this early period, many abuses and superstitions had crept in, which even the fathers who admit the worship do not fail to condemn.

The practice of relic-worship, however, and the feeling on which it was founded, were not suffered to pass without a protest. Vigilantius, in a treatise which is now lost, but the tenor of which is learned from his adversary, Jerome, reprobated in the strongest terms the excesses to which it was carried, and indeed the essential principles on which the practice rests. But the protest fell without drawing an echo from the contemporary mind. Vigilantius had so few followers, that were it not for the refutation of his work against relics composed by Jerome, we should have no record of his opposition to the popular view; and it is urged by Catholics, as a proof of the universal acquiescence of the church of the 4th c. in the practice of relic-worship, that in an age remarkable for intellectual activity and for polemical ardor—an age which in 25 years saw nearly 30 councils in the cause of the Pelagian heresy—it was not even found necessary to call a single council to condemn Vigilantius.

The writings of Augustine, of Paulinus of Nola, of Ephrem the Syrian, of Gregory the great, and others, are full of examples of the miraculous virtue ascribed to relics, and of the variety and the extensive multiplication of sacred memorials of all kinds. Nor was this confined to the orthodox alone; all the different parties in the controversy on the incarnation agreed with Catholics and with one another on this subject, and even the Iconoclasts, at the very time that they most fiercely repudiated the use of images, admitted without difficulty the veneration of relics.

In the age of the crusades a fresh impulse was given to the worship of relics in the west by the novelty and variety of the sacred objects brought home from the churches of Syria, Asia Minor, and Constantinople by crusaders, by palmers returning from Palestine, and by the Latin conquerors of Constantinople; and it is admitted by the most zealous Catholics that at this period many false, and perhaps even absurd and ridiculous relics were introduced, and were successfully commended to the veneration of individuals or individual churches in the west; nor do they venture to doubt that abuse and superstition found their way side by side with what they regard as the genuine and authorized worship of the church. Nevertheless, with the exception of the Waldenses, Wycliffe, and a few isolated individuals, the practice remained unchallenged till the 16th c., when, in common with many other doctrines and practices of the church of Rome, it was utterly repudiated by the reformers. Catholics, however, allege that the practice, as sanctioned by the church, has nothing in common with the abuses which form the main ground of the objections alleged by Protestants. The Roman Catholic use of relics, as authorized by the church, is to serve as incentives to faith and piety, by recalling vividly to men's minds the lives, and, as it were, the corporeal presence and the earthly converse of the saints, and thus placing before them, in a more touching manner, the virtues which, in the examples, are held up for men's imitation. The decree of the council of Trent connects the subject of relic-worship with the general question of saint-worship, and regards the relics of the saints not as possessing intrinsic virtue, but only as instruments "through which God bestows benefits on men." See Invocation of Saints.

The Greek and other oriental churches, and most of the oriental sects, agree with Roman Catholics in the practice of relic-worship. On the contrary, the reformed churches, without exception, have rejected the usage as unscriptural, calculated to withdraw from the worship of the one God, and deformed by numerous superstitions. They regard a large proportion of the relics which Roman Catholics worship as false and supposititious, and they specify several, regarding the spuriousness of which even learned Catholics appear to be satisfied. Some relics have been the subject of much controversy among Roman Catholics themselves. See Holy Coat, Holy Places, Loretto, Pilgrim. It may be added that the practice of relic-worship forms a notable feature of the Mohammedan usage of pilgrimages. The holy cities of Mecca and Medina, and the celebrated mosque of Omar at Jerusalem, owe most of their holiness in Mohammedan eyes to the memorials of the prophet, and other relics which they contain; and the celebrated *sanjak-sherif* or sacred standard at Constantinople, is believed to be formed of the nether garment of Mohammed. The practice occupies a still more important place in Buddhism (q.v.—see also Ceylon).

RELIEF, in English law, means a payment by a tenant or vassal to a lord, the theory being, according to feudal law, that relief (*relevium*, Lat. *relevare*) is a restoration of the lands after the wardship or guardianship of the lord has ceased, and the vassal has attained majority.—Relief is also the common term used among the poor and among parochial officers to denote the pecuniary assistance given under the poor-laws to a pauper. See Relieving Officer.

RELIEVING OFFICER is a person appointed in an English union or large parish to administer relief, or rather to inquire into the title of destitute persons to be relieved by such union or parish. He is appointed by the board of guardians, and his duty is to receive all applications for relief, to inquire into the truth of the facts alleged by the paupers as to their place of settlement, their state of health, ability to work, and the state of their family. In discharging this duty, he requires to visit the house where the pauper lives, to relieve cases of urgent necessity, etc., and to keep a list of all these paupers, and enter what is done with them in his book.

RELIE'VO. See ALTO-RELIEVO.

RELIGION, in Christian countries, is generally understood as the feeling of reverence toward the Creator and Ruler of the world, together with all those acts of worship and service to which that feeling leads. The root of this sentiment lies in the very constitution of man, and in the circumstances in which he is placed, and manifests itself abundantly even where the one supreme God of the Christian is unknown. Man is naturally religious, and if he is ignorant of the true God, he must make to himself false ones. He is surrounded by dangers and difficulties; he sees the mighty powers of nature at work all around, pregnant to him with hope and fear, and yet inscrutable in their working, and beyond his control. Hence arises the feeling of *dependence* upon something more powerful than himself—the very germ of religion. These operations of nature, again, he has only one way of conceiving and accounting for. The idea of physical causes is one of late growth; to the primitive man, there is only one kind of agency he can understand—that of a will or mind like his own. Hence all things that he sees moving and acting become to him animated, conscious beings, with thoughts and passions similar to those of men; and what more natural than that he should seek, by offerings and entreaties, to secure their favor, or propitiate their malignity or anger. There is no doubt a vast distance between the reverence with which the Christian looks up to Him that fills the universe, and that of the poor fetich-worshipers (see FETICHISM), but in both cases it is the same feeling that is at the bottom—they are both manifesting religion.*

According to this view, religion includes all forms of belief in the unseen and spiritual powers or gods, together with the practices arising out of those beliefs. The forms that religious belief has assumed are endless, but they may be all classed under two heads: *Monotheism*, or the belief in *one* God; and *Polytheism*, or the belief in *many* gods. The several modes of religious belief and worship are treated in this work each under its own name. See JEWS; CHRISTIANITY; ENGLAND, CHURCH OF; ROMAN CATHOLIC CHURCH; PRESBYTERIANISM; FRIENDS; GREEK RELIGION; MOHAMMEDANISM; INDIA, RELIGION; BUDDHISM; LAMAISM, etc. Subjoined is a statistical table of the divisions of mankind in this respect.

I.—JEWS.

Austria	1,600,000
Russia in Europe	2,612,179
German Empire	512,158
Belgium	1,500
Denmark	4,400
Würtemberg	12,244
Alsace and Lorraine	40,938
France	49,439
Great Britain and Ireland	42,000
Italy	25,000
Netherlands	68,003
Switzerland	6,996
Sweden	1,836
Turkey	150,000
Roumania	247,424
Servia	1,800
United States	73,265
Canada	1,241
Morocco	340,000
New South Wales	2,395
Tasmania	200
West Australia	62
Asia	2,138,000
	7,931,080

II.—CHRISTIANS.

I.—ROMAN CATHOLICS.

Europe—	
Austria and Hungary	24,000,000
Belgium	5,239,321
France	35,387,703
Denmark	1,857
German Empire	14,867,463
Würtemberg	533,542
Saxony	53,642
Alsace and Lorraine	234,588
Great Britain and Ireland	6,200,000
Greece	24,000
Italy	26,746,253
Netherlands	1,313,052
Portugal	3,994,750
Russia in Europe	7,300,464
Spain	16,240.000
Sweden	573
Switzerland	1,084.369
Turkey	900,000
America—	
Argentine Confederation	1,734,000
Bolivia	1,742,352
Brazil	10,196,238
Chili	2,068,447
Colombia	2,916,703
Costa Rica	190,000
Ecuador	1,200,000
Guatemala	1,180,000
Haiti	800,000
Honduras	250,000
Mexico	9,000,000
Nicaragua	350,000
Paraguay	1,337,439
Peru	200,000
San Domingo	136,500
San Salvador	434,520
Venezuela	1,784,194
United States	2,000,000
Canada	1,492,029

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* The word *religion* is of Latin origin, and according to its etymology would mean "binding," "obligation," or rather "restraint." It was applied by the Romans to all actions in which men are guided, not by motives deducible from the ordinary course of nature, but by regard to some unseen power or mysterious influence; as when Livy says of a spot in the forum: *ubi despui religio est*, "where spitting is a matter of religion;" i.e., where there is a religious scruple restraining people from spitting.

Africa—		Asiatic Turkey	260,000
Algeria	129,629	Russia in Asia	6,000
Cape of Good Hope	92,900	Arabia and Persia	11,000
Egypt	88,000	Australasia—	
Liberia	7,000	New South Wales	147,627
Morocco	250	New Zealand	99,514
Natal	17,000	Queensland	20,000
Asia—		South Australia	55.476
India	400,000	Tasmania	40,000
Asiatic Archipelago	2,000,000	Victoria	300,000
Ceylon	182,613	Western Australia	7.118
China	2,000		
Hong-Kong	1,000		186,860,076

II.—GREEK CHURCH.

Austria	3,500,000	Roumania	4,605,510
" Greek Catholics	3,900,000	Servia	1,098,281
Saxony	554	Egypt,	34,000
Greece	1,423,894		
Russia	54,363,810		82,926,049
Turkey	14,000,000		

III.—PROTESTANTS.

Europe—		Africa—	
Austria	3,600,000	Cape of Good Hope	98,900
Belgium	13,000	Algeria	91,228
Denmark	1,770.000	Egypt	7,100
France	580,757	Liberia	7,000
German Empire	25,579.709	Morocco	250
Würtemberg	1,248,838	Natal	25,000
Smaller German Principalities	3,744,414	Madagascar	40,000
Russia	2,565,345	Asia—	
Saxony	2,493,422	Ceylon	36,000
Alsace and Lorraine	271,198	India	448,329
Great Britain and Ireland	24,000,000	Hong-Kong	2,900
Italy	20,000	Java	14,000
Netherlands	2,193,801	Russia in Asia	40,000
Portugal	500	Arabia, Persia Turkey China, and Archipelago	89,000
Spain	60,000		
Sweden	4,339,000		
Norway	1,762,313	Australasia—	
Switzerland	1,566,347	New South Wales	339,000
Turkey	40,000	New Zealand	200,000
Ionian islands	20,000	Queensland	100,000
America—		South Australia	150,000
Argentine Confederation	2,400	Tasmania	49.000
Dutch, Danish, and Swedish possessions	97,000	Victoria	400,000
Canada	1,973,732	West Australia	17,458
United States	20,000,000	Polynesia	1,000,000
			101,091,941

III.—MOHAMMEDANS.

Russia	2,359,000	Egypt	16,250,000
Turkey	17,300,000	Ceylon	171,542
Turkistan	10,000,000	Indian Archipelago, Madagascar, and African tribes	10,000,000
India	40,882,537		
Persia	4,400,000		
Algeria	2,090,515		103,458,594

IV.—HINDUS.

India	139,246,568

V.—MAGIAN RELIGION AND PARSEES.

India	1,000,000
Persia	7,190
	1,007,190

VI.—BUDDHISM AND RELIGIONS OF CHINA AND JAPAN.

India	2,882,851	Siam	11,000,000
Japan	32,794,897	Corea	9,000,000
China	425,213,152		
Java	190,600		483,015,475
Ceylon	1,984,575		

SUMMARY.

The religions of the world, from the above tables, may be shortly summarized in round numbers as follow:

1. Jews	8,000,000
2. Christians	371,000,000
3. Mohammedans	103,500,000
4. Hindus	139,500,000
5. Buddhists	483,000,000
6. To which may be added the Fetichism of the aboriginal tribes of Africa, America, etc	189,000,000
Total	1,294,000,000

—which, according to statistical writers, is the present population of the globe.

As illustrative of the sects into which the Protestant world is divided, it may be stated that in Great Britain there are no less than 146 religious denominations. The following table, drawn up from reliable data, shows the numerical strength of the principal churches and divisions of the Protestant part of Christendom, with which they are principally connected:

Lutherans	33,767,924	Brethren	108,422
Anglican church	14,459,000	Mormons	100,902
Calvinists	13,716,958	Swedenborgians	12,000
Presbyterians	3,866,000	Evangelical Union	10,319
Baptists	2,439,486	Irvingites	6,000
Methodists	4,406,422	Christian Disciples	2,471
Congregationalists	1,445,683	Sandemanians	1,700
Universalists	656,000	Campbellites	710
Quakers	203,091	Free Christian Brethren	340
Unitarians	183,000	Christian Chartists	220
Moravians	157,925		

RELIGION, OFFENSES AGAINST. See BRAWLING IN CHURCHES. In Scotland the crime of blasphemy is sometimes described as the crime of treason or lese-majesty against God, which consists in denying his being and attributes, and uttering impious and profane things against God, or the authority of the holy Scriptures. The crime was more rigorously punished by the old statutes of Scotland than by those of England: but the statute 6 Geo. IV. c. 47 declared it expedient that the punishment should be the same, and enacted accordingly. Profanity is in Scotland treated as an offense lower in degree than blasphemy, and includes profane swearing, which is punishable with a fine by justices of the peace; scoffing at religion, or the public mocking or contempt of religion, which is punishable in the same manner, and the disturbance of public worship. The first statute providing against disturbances of public worship was dated 1551, which inflicted a fine; but a later statute of 1587 added escheat of movables as part of the punishment, and applied the penalty to all cases of raising a fray or disturbance in the kirkyard equally as in the kirk, to the troubling or dispersing of the people assembled there for religious purposes.

RELIGIOUS AMENDMENT TO THE CONSTITUTION, the proposed insertion in the constitution of the United States of an acknowledgment of God, the Scriptures, and Christ. The reasons advanced by its advocates are: 1. The nation must proceed from a power higher than itself. Having supreme jurisdiction over a portion of the earth, it acknowledges no superior unless it be God. As, therefore, it must be in subjection to the supreme governor, the fact ought to be acknowledged in the constitution. 2 The United States are a Christian nation. The first settlers acknowledged God, the Bible, and Christ. Christianity pervades our institutions, is the preservative element and inspiring soul of the national life. It should, therefore, be recognized in the constitution. 3. The present condition of the country requires the amendment to be made. Large numbers of persons holding secular, infidel, and socialistic theories of government have made it their home, and are diffusing their sentiments; education is discussed more earnestly than ever before, and many are seeking to separate from it all religious principles and restraints. Such facts require that the religious institutions of the land should have a guaranty in the constitution. The reasons offered against the amendment are: 1. The quality of the acts of a state depends on their true nature, and not their outward appearance; on what the state really is, and not what it professes to be. If the people of a country act as Christians, no formal profession of being so is necessary; if they do not act so, no formal profession can be of any avail. 2. Christianity first made known to the world the true idea of religion. In settling the functions of the church it declared also those of the state; it determined their respective limits, within which each might act without collision with the other. The church and the state correlate each other, each fulfilling its proper ends. The state gives the church protection, security, and liberty; the church influences the state, forming the character of citizens, and elevating, enlarging, and purifying the laws. All this can be done without making any alteration in the constitution. 3. The advocates of the amendment confess that hitherto it has been a fact that Christianity is an element of the common law of the land. As this has been the fact under the constitution as it is, it may continue to be the fact without the constitution being changed. 4. There are in the constitution implied acknowledgments of God, in the oaths which it requires to be administered; of the Scriptures, in recognizing Sunday as a day of rest from avocations required on other days; of religion, in forbidding any law to be made establishing it or prohibiting the free exercise thereof; and of Christ, in using, concerning him, the expression "our Lord." Without deciding the question, which may finally depend on considerations not above adduced on either side, it is open to remark that not all the above arguments against the proposed amendment seem valid; some proving too much, and others inapplicable to the case. The movement for amendment, however, does not seem to be gaining strength.

RELIGIOUS ORDERS. See MONACHISM, *ante*.

RELIGIOUS TRACT SOCIETY, a society for the promotion of religion by the publication and circulation of religious tracts and small books. By far the most important religious tract society in the world is that of London, which was founded in 1799.

There are now, indeed, numerous religious tract societies in different parts of the world, comparatively limited in their field of operations; this great society reckoning many of them as its branches and auxiliaries. The advantage likely to accrue to the cause of religious truth by the diffusion of tracts and pamphlets was thoroughly appreciated at the time of the reformation, but no society was formed for the purpose. In the 17th c. several traces are found of associations for printing and promoting the sale of religious works, but none of them seems to have existed long, or to have been intended for permanence. The English "society for promoting Christian knowledge," founded in 1701, avowed, for one of its objects, "to disperse, both at home and abroad, Bibles and tracts of religion." In 1750 a society was formed in England called "The Society for Promoting Religious Knowledge among the Poor," not, like the former, confined to the church of England, but embracing Christians of all denominations, which published many tracts and books; and shortly after similar societies were founded in Edinburgh and Glasgow, which, however, were of brief existence. The design of the religious tract society originated with Mr. Burder, a minister at Coventry, and amongst its founders were Rowland Hill, Matthew Wilks, and other ministers eminent in their day. It was founded on occasion of the annual meeting of the London missionary society. Its beginnings were humble, but it soon expanded, until its income, from contributions of benevolence, has for many years been always above £4,000, sometimes nearly twice that sum. It derives also a large income from the sale of its publications. Its operations have extended over all quarters of the world, and it has issued books and tracts in more than 100 different languages and dialects, thus rendering very efficient assistance to missionary and other evangelistic operations. Many of the publications of the society, except during the first years of its existence, have been books rather than tracts. It has produced many new works, and also many reprints and abridgments.

Objections are sometimes strongly urged against its mode of operations, as interfering with the natural course of the book-trade and checking free commercial enterprise; to which it has been always replied that the diffusion of good and cheap books has increased the demand for them, and that the influence of the society has been favorable and not unfavorable to the book-trade in general. It is impossible, however, to accept this as any proper answer to the objections in question. Fair competition in trade is a sacred principle not lightly to be interfered with, and it is sufficient to say that certain members of the general publishing business complain of being encountered by a system of production which leaves them no hope of competing successfully with the society. That tracts distinctly religious may be rendered a valuable engine of spiritual and social advancement is not to be disputed; and those impressed with this conviction cannot but regret that among the immense mass of tracts issued in Great Britain and the United States not a few, owing to the exaggerated and mistaken views they present not only of the facts of life but of the teaching of Scripture, are perhaps more calculated to damage than promote the cause they are meant to serve.

RELIQUARY, a case or box to contain relics. They are made of all kinds of materials, such as wood, iron, stone, ivory, silver, etc., and are frequently ornamented with costly jewels. Shrines are of the same description. That of the "three kings," at Cologne, has jewels valued at £240,000.

REMAINDER is a term much used in the law of England. Thus, if the owner of the fee-simple or freehold of lands give them by will or deed to A for life, and after his decease to B and his heirs, the interest of B is called the remainder, because, after deducting A's life-estate, all that remains belongs to B. A remainder is distinguished from a reversion in this, that in the latter case the remainder returns to the owner of the estate himself, and so it is called, in that instance, a reversion instead of a remainder. A contingent remainder is too technical a term to be popularly explained, though it plays an important part in the law of real property in England. It is an estate which may or may not ever become vested or enjoyable.

REMBANG, a residency of Java, has an area of 2,650 sq.m., and (Dec. 31, 1873) a pop. of 925,508, including 665 Europeans and 15,402 Chinese. There are extensive forests, containing fine timber, the haunts of wild cattle, swine, and three species of tiger. The products are chiefly cocoa-nuts, coffee, sugar, tobacco, and cotton. Boat-building, fishing, weaving, making earthenware and paper, gold and silver work, are occupations.—Rembang, the capital, is a sea-port. Pop. 12,000. There is a government school, an institute for girls, and a Protestant church.

REMBRANDT HERMANSZOON, commonly called REMBRANDT VAN RHYN, was the son of a miller, Herman Gerritsz van Rhyn, whose house (where the painter was born) and mill were situated on an arm of the Rhine at Leyden. Rembrandt Hermanszoon was born either on July 15, 1606, or in 1608. The former date rests on the authority of the *Description of Leyden*, published in 1641, by Orlers, burgomaster of that town, under whose custody, along with other registers of the city, were those of the registers of baptism, since lost. The latter date rests on the painter's marriage-certificate, lately discovered, dated June 10, 1634, in which Rembrandt Hermanszoon is stated to be aged 26, and thus the year of his birth 1608. He attended for a short time the Latin school at Leyden; and after studying art three years under Jacob van Swanenburg, and for a very limited period under Pieter Lastman at Amsterdam, and Jacob Pinas at Haarlem, he returned home, and devoted himself to the study of nature. His works now attracted some attention; and about the year 1630 he was encouraged to establish himself at Amsterdam, where he soon entered on a most successful career, and executed numerous works—portraits, landscapes, historical and *genre* subjects, and those wondrous etchings, numbering above 360, which have served almost as much as his paintings to raise his reputation so high. Rembrandt Hermanszoon holds the chief place in the Dutch school; his power and originality are exemplified in almost every branch of art; and as examples of composition, expression, color, and light and shade, his works rank with those of the greatest artists. He had numerous pupils, many of whom, such as Gerard Dow, G. Flinck, F. Bol, N. Maas, P. de Koning, and Vanden Eeckhout, were distinguished artists. Rembrandt Hermanszoon spent his large gains in the indulgence of a taste for works of art, arms, and objects of *vertù*, as is proved by an inventory of his effects, extracted from the registers of the insolvents' court at Amsterdam, for he got into difficulties, partly from his expensive habits, and partly on account of claims by the tutors of his son, after the death of his first wife. He married a second time, and left two children; his son Titus, by his first wife, predeceased him. Many interesting matters connected with the history of this great painter have been brought to light, and published so lately as 1853, by Dr. P. Scheltema, keeper of records at Amsterdam. The date of the painter's decease was a matter of doubt; but among other documents discovered by this author, the following extract, from the register of burials of the city of Amsterdam, proves that he was interred in the Westerkerk (west church) on Oct. 8, 1669: "Deynsdach, Oct. 8, 1669, Rembrant van Rijn, Schilder, op de Rosegraacht, teghenover het Doolhof. Laet na 2 Kynders."—("This day, Oct. 8, 1669 [was buried] Rembrandt van Rhyn, painter, on the Rosegraacht [rose-canal], opposite the labyrinth. He leaves two children.")

REMIREMONT, a small t. of France, in the department of Vosges, stands on the left bank of the Moselle, 17 m. s.e. of Epinal. Here, two abbeys, founded in 620, were destroyed in the 10th c., but afterward rebuilt. Of these, the more important was for lady canonesses. Its abbess was a princess of the empire, and those over whom she presided were all descended from families which had been noble for at least four generations. The remains of the abbey are the finest buildings in the town. In the Mairie is a public library of 8,000 volumes; cotton goods, leather, and iron-ware are manufactured. Remiremont is the great mart for the neighboring mountain districts. Pop. '72, 6,014.

REMISSIO INJU'RIÆ, in Scotch law, denotes a forgiveness of an injury, and it is set up in answer to an action of divorce for adultery. Forgiveness implies that the party knew of the injury, and acted as if it had never happened; and it is proved by words or acts, such as cohabitation. In English law, it is called condonation. In Scotch law, remission is an extinguishment of a crime by pardon or by act of parliament, but it does not prevent a private party recovering damages.

REMITTENT FEVER is one of the three varieties of fever arising from malaria or marsh-poison—the two others being intermittent fever, or ague (q.v.), and yellow fever. In its milder forms, it scarcely differs from severe intermittent fever; while in its more serious form, it may approximate closely to yellow fever. As the nature of the poison on which it depends is sufficiently noticed in the article MIASMA, we shall at once proceed to describe the most characteristic symptoms. The attack may be either sudden or preceded by languor, chilliness, and a general feeling of *malaria*. Then comes a cold stage, similar to that occurring in ague, and usually of short duration. This is followed by a hot stage, in which the symptoms are commonly far more intense than those exhibited in the worst forms of ague. Giddiness proceeding to delirium is not uncommon, and is a bad symptom; while, in other cases, drowsiness or lethargy is one of the most marked symptoms. There is often great tenderness or pain in the region of the stomach, and vomiting—the vomited matter frequently containing bile or blood. A remission of these symptoms occurs, in mild cases, in six or seven hours; but in severe cases, the paroxysm may continue for 24 hours or longer. The remission is sometimes, but not always, accompanied with sweating. The duration of the remission is as varied as that of the paroxysm, varying from two or three to thirty hours, or even longer. The fever then returns with increased severity, and without any cold stage; and then the paroxysms and remissions proceed, most commonly according to no recognizable law, till the case terminates either fatally or in convalescence. In favorable cases, convalescence is usually established in about a week. The severer forms of this fever are often accompanied with more or less jaundice, and hence the disease has received the name of bilious remittent fever. It is also known as jungle fever, lake fever (from its prevalence on the border of the great American lakes); and the African, Bengal, Levant, Walcheren, and other similar local fevers, are merely synonyms of this disease. In England the disease is very rare; and when it occurs, it is usually mild. The disease is most severe in southern Asia, western Africa, Central America, and the West India islands.

The first object of treatment is to reduce the circulation during the hot stage. This is done by bleeding, followed by a dose of 5 grains each of calomel and James's powder, and, after an interval of three or four hours, by a sharp cathartic—as, for instance, the ordinary black draught. On the morning of the following day, the remission will probably be more complete, when quinine, either alone or in combination with the purgative mixture, should be freely and repeatedly administered. A mixture of antimonial wine with acetate of potash should also be given every two or three hours, so as to soften the skin and increase the action of the kidneys. Sir Ranald Martin—our highest authority in relation to tropical diseases—has directed attention to the fact, that the patient must be carefully watched during the period of convalescence. A timely removal from all malarious influence, by a change of climate or a sea-voyage, is of the highest importance, and is more likely than any other means to prevent fatal relapses into other forms of fever, or into dysentery, which so frequently occur to our troops at stations where miasmatic influences are rife. Although the above sketch of treatment is applicable in most cases, there are some forms of this fever in which blood-letting cannot be borne; and almost every epidemic fever of this kind requires special modifications of treatment. The following data extracted from a table drawn up by sir Alexander Tulloch, will give some idea of the frequency of this disease and the variations in intensity:

	Period of observation.	Aggregate strength.	Number attacked.	Died.	Ratio of deaths to cases attacked.
Jamaica	20 years.	51,567	38,393	5,114	1 to 8
Gibraltar	19 "	60,269	1,522	423	1 " 3⅗
Ionian Islands	20 "	70,298	6,984	628	1 " 11
Ceylon	20 "	42,978	4,643	868	1 " 5⅓
Madras	5 "	31,627	1,139	54	1 " 21
Bengal	5 "	38,136	1,811	89	1 " 14⅔
W. Africa	18 "	1,848	1,601	739	1 " 2

REMONSTRANTS. See ARMINIUS.

REMORA, or SUCKING-FISH, *Echeneis*, a genus of fishes which Cuvier placed among the *discoboli* (q.v.), but which Müller assigns to the order *anacanths*, and regards as constituting an entire family, *echeneidæ*. Their chief relation to the *discoboli*, indeed, is in the possession of a sucker, by which to affix themselves to objects of various kinds; but the sucker itself is very different. The remoras have an elongated body, covered with very small scales; one soft-rayed dorsal fin, situated above the anal fin; the head flattened, and covered with an elongated disk extending back beyond it, which is the sucker, the mouth large, with numerous small recurved teeth on both jaws, the vomer, and the tongue. The sucker-disk exhibits numerous transverse cartilaginous laminæ directed backward, and has a free flexible broad margin. These laminæ are formed by modification of the spinous processes of a first dorsal fin. They are moved simultaneously by sets of muscles raising or depressing them, and when they are raised after the margin of the disk has been closely applied to a smooth surface, a vacuum is created; and so powerful is this apparatus, that great weights may be dragged by a remora; whilst it obstinately refuses to let go its hold, and will even submit to be torn to pieces before it does so. The common remora of the Mediterranean, and of the ancients, is a small fish, seldom more than 8 in. long, of a dusky-brown color. It is found in the Atlantic, and occasionally as far n. as the British coast. It is frequently seen among the other fishes following ships, and often attaches itself by its sucker to some other fish, even of a kind that would make haste to devour it if it could be reached—an instance of which once occurred on the British coast, a remora being taken affixed to a cod—often also to the rudder or bottom of a ship. The ancients imagined that it had power to impede or arrest the course of a ship, a fable which continued to be credited till recent times. Thus, it was alleged, was Antony's ship detained from getting soon enough into action in the memorable and decisive battle of Actium. Of what use its power of adhesion is to the remora, is matter of mere conjecture. The remora is very palatable. There are about ten known species, some of the tropical ones much larger than the common remora. One of them is said, on the authority of Commerson, to be used on the coasts of Mozambique for the curious purpose of catching turtles. A ring is fixed round its tail, with a long cord, and the fish, placed in a vessel of sea-water, is carried out in a boat; the fishermen row gently toward a sleeping turtle, and throw the remora toward it, which seldom fails immediately to affix itself, when the cord is drawn in, and the turtle becomes an easy prey.

REMOTENESS, in law, means that a provision of a will or deed, in favor of some person, does not vest for so long a time that it violates the "rule against perpetuities." This rule requires that an estate shall vest within a life or lives in being, with the addition of 21 years and the period of gestation afterward. The object of the rule is to keep estates from being inalienable. It was taken from the common provision in a marriage settlement, giving a life estate to the parties to the settlement, and the fee to the unborn child or children by the marriage. Such child or children would, upon birth have a remainder in fee, and at the age of 21 could make a conveyance, and join with their parents to convey the whole fee. Under such a provision, alienation could be prevented only for the lives of the parents, and till the child came to majority. The term of 21 years may also be employed absolutely, irrespective of a minority. Any provision exceeding the period of remoteness is void.

REMOULADE, a term in cookery for a fine kind of salad-dressing, consisting of the yelks of two eggs, boiled hard, flour of mustard, about a teaspoonful, rubbed up with three or four tablespoonfuls of oil; when they are thoroughly incorporated, add two tablespoonfuls of vinegar and a little pepper, and other flavoring materials according to taste. It is much used in making the salad called Mayonnaise.

REMOVAL OF GOODS by a tenant of a house to prevent the landlord distraining or seizing them in payment of rent, is attended with this consequence: if the rent is already due, and not merely current rent, then, if a tenant fraudulently or clandestinely remove the goods from the premises, the landlord may, within 30 days thereafter, take and seize these goods wherever they are found, and sell them, by way of payment of his rent. If the tenant remove the goods the day before the rent becomes due, the landlord cannot so follow the goods. Whoever assists the tenant to remove his goods fraudulently, forfeits to the landlord double the value of the goods removed.

REMOVAL OF PAUPERS, in the law of England, is the technical term applied to the compulsory removal of paupers from a parish in which they have become destitute, to the parish or union settlement, and which, therefore, is bound to maintain them. The right of parochial officers to remove paupers in such circumstances has long been considered as one of doubtful wisdom, and the propriety of continuing it has latterly been much discussed. As the law stands, wherever a person becomes destitute in a parish in which he was not born, or in which he has not acquired a settlement (q.v.), as it is called, the overseers may apply to a justice of the peace at once to remove him to his own parish. In such a case, notice must be given by the removing parish to the parish of settlement, so that the latter may oppose the proceeding; and this gives rise to frequent litigation, for the point turns on the antecedent history of the pauper, or it may be of the pauper's father or grandfather. The right of removing paupers is as old as 13 Charles II. At first, it was in the power of the overseers, whenever a poor person came into the parish who was likely to become chargeable, to apply for a warrant to remove him after 40 days. But this was thought too great a restriction on the natural liberty of poor persons to go where they like in the hope of bettering themselves, and the power of removal was restricted to cases where they have already become actually destitute, and apply for relief. Even that limitation was thought to be too oppressive on the poor man; and by a statute of 1846, whenever a poor man had lived in any parish, where he had no settlement previously, for five years, it was not allowed to remove him thereafter at all, but the expense of his maintenance fell upon the common fund of the union. By a later statute of 1865, this period was reduced to one year, and he is now irremovable not only if he has lived one year in a parish not his own, but in any one union; so that now the removability of paupers is greatly checked, and made less oppressive.

REMOVING OF TENANTS, in Scotch law, is the giving up of possession by a tenant after the expiry of his lease or term. There must have been a previous notice to quit, or warning, before a tenant can be compelled to remove, and this notice is 40 days before Whitsunday; i.e., before May 15. If there is no express stipulation in the lease binding the tenant to remove at the end of the lease, then the landlord must give warning, which he does by summons of removing in the sheriff court; and if the tenant do not punctually remove, decree of removal may be obtained. If there is a stipulation to remove, then that is equivalent to a decree of removing, and a sheriff-officer, with a written authority from the landlord, can remove the tenant by force. In England no notice to quit is necessary on either side if the lease was for a definite term; but if it was indefinite, then it is treated as a lease from year to year, and half a year's notice to quit must be given by the landlord. If, however, the tenant wrongfully refuse to quit, there is in most cases no summary mode of ejecting him, and an action of ejectment is necessary.

REMSCHEID, a manufacturing t. of Prussia, occupies a height of 1110 ft. above sea-level, in the government of Düsseldorf, and 18 m. e.s.e. of the city of that name. Originally a villa, it was in possession of a church as early as 1189. It contained several iron foundries in 1580, in which pig-iron was worked into bars by hand. Its iron trade and manufactures were advanced by the immigration of numbers of artisan refugees (q.v.). It carries on extensive manufactures of iron-wares, cutlery, etc., which are exported to all parts of the world. Pop. '71, 22.017; '75, 26,120.

RÉMUSAT, CHARLES, Comte de, a French philosopher and politician, son of Auguste Laurent comte de Rémusat, a Provençal gentleman of some note, who held various public offices during the first empire and after the restoration, was b. at Paris, Mar. 14, 1797, and studied with brilliant success at the lycée Napoléon. He made his political *début* in 1818 as a doctrinaire journalist, allying himself closely with Guizot, who, he confessed, had exercised a greater influence on the formation of his opinions than any other; but he subsequently withdrew from this connection, and became more independently liberal, though he always remained temperate and prudent in his views. Among his earlier political essays, the most important are *Sur la Responsabilité des Ministères; Sur la Liberté de la Presse; Sur la Procédure par Jurés en Matière Criminelle* (1820); and *Sur les Amende-*

ments à la Loi des Elections (1820). On the establishment of the *Globe* in 1824, Rémusat became one of its most indefatigable contributors, and his name appears in the list of journalists who signed the protest against the fatal "ordonnances" of the minister Polignac, which brought about the July revolution. After 1830 Rémusat entered the French chambers as deputy of Muret in the Haute-Garonne, representing it till 1848. He supported the ministry of Casimir Périer, was for a brief period under-secretary of state (1836) in that of comte Molé; and in 1840, when the government passed into the hands of Thiers, Rémusat was made minister of the interior, but soon resigned the office. After the flight of Louis Philippe, he continued a member of the constituent and legislative assemblies, and was a warm supporter of the party of order. He was exiled after the *coup d'état* of Louis Napoleon, but subsequently received permission to return to France. He devoted himself to literary and scientific studies, till, in Aug., 1871, M. Thiers called him to hold the portfolio of foreign affairs, which he retained till 1873. He died June 6, 1875. He was long a well-known contributor to the *Revue des Deux Mondes*. Among his writings are his *Essais de Philosophie* (Paris, 2 vols., 1842); *Abelard* (2 vols., 1845); *Passé et Présent* (2 vols., 1847); *Angleterre au XVIIIe. Siècle* (1856); *Bacon* (1858); *Hartley* (1874); *Histoire de la Philosophie Anglaise de Bacon à Locke* (1875), and his philosophical drama, *Abelard* (1877).

RÉMUSAT, Claire Elisabeth Jeanne Gravion de Vergennes, Comtesse de, 1780–1821; b. Paris; grand-niece of Vergennes, prime minister under Louis XVI: a noted beauty of the court of Napoleon I., an intimate friend of Josephine, a woman of rare moral and intellectual endowments, and author of an *Essai sur l'Éducation des Femmes* (1824), and of the *Mémoires de Madame de Rémusat* (1879). Notwithstanding a life of dignity and honor spent in the heart of the corrupt and vulgar court of Napoleon I., and in which she became a semi-historical figure, she is best known by her posthumous *mémoires*, which expose the baseness of Bonaparte's character by an analytical narrative of his home life. Partisans of the emperor throw doubts on the disinterestedness of her judgment. But the work affords its own evidences.

REMUSAT, Jean Pierre Abel, a distinguished Chinese scholar, was born at Paris, Sept. 5, 1788, studied medicine, and took his diploma in 1818; but as early as 1811 had published an *Essai sur la Langue et la Littérature Chinoises*, the fruit of five years' arduous work. In 1818 the conscription seized him, but, instead of being compelled to serve as a common soldier, he was appointed assistant-surgeon in the Paris military hospitals, and was subsequently intrusted with the charge of fever-patients at the hospital Montaigu. In the midst of his arduous and harassing professional duties, he found time to prepare for the press his *Uranographie Mongole*, and *Dissertation sur la Nature Monosyllabique attribuée communément à la Langue Chinoise*. At last, however, the day came when he was at liberty to devote himself entirely to Sinological studies. The abbé Montesquiou, minister of the interior during the first restoration of the Bourbons, instituted a chair of Chinese at the collége de France, and Rémusat was named professor, Nov. 9, 1814. He delivered a splendid inaugural address in Jan., 1815, an analysis of which appeared in the *Moniteur* of Feb. 1, executed by Silvestre de Sacy himself. Of the numerous works that he wrote subsequent to this period, we may mention *Recherches sur les Langues Tartares* (1820), a work in some sort preparatory to his *Eléments de la Grammaire Chinoise* (1822), the grandest monument of the vast Sinological erudition and labor of Rémusat. Another of his important philological productions was his *Recherches sur l'Origine et la Formation de l'Ecriture Chinoise* (1827). "Although acquainted," says M. Walckenaer, "with several of the most difficult languages of Asia, and with almost all the ancient and modern languages of Europe, he regarded such knowledge as only a means to an end. . . . . In a crowd of treatises, dissertations, critical analyses, and translations, either published as separate works or inserted in *Mémoires*, he has endeavored to embrace everything relating to the nations whom he proposed to make known. Religious beliefs, philosophical systems, natural history, geography, political revolutions, the origins of races, biography, literature, manners, habits, and customs—he has treated all in an equally masterly style." Among the works of Rémusat which illustrate this *éloge* of M. Walckenaer are his *Etude Historique sur la Médecine des Chinois; Tableau Complet des Connaissances des Chinois en Histoire Naturelle* (unfinished); *Sur la Pierre Iu* (a curiously learned disquisition on a crowd of historical questions and religious rites); *Notice sur la Chine et ses Habitants* (in which the author treats of the extent, administration, manners, commerce, etc., of China); *Sur l'Extension de l'Empire Chinois en Occident depuis le Premier Siècle avant Jésus-Christ jusqu'à nos Jours*, a work that has thrown much light on the interesting question: Who were the barbarians that overthrew the Roman empire? Rémusat, in particular, paid great attention to the religions of China, except, strange to say, that of Confucius. He was the first to make known in Europe the life and opinions of the philosopher Laou-Tsze, head of the religious sect *Taou-tsé*, and wrote numerous works, more or less valuable, on the history of Buddhism. A list of his various works is given in the article "Rémusat," in the *Nouvelle Biographie Générale*, to which we are chiefly indebted for our information. In 1818 Rémusat became one of the editors of the *Journal des Savants;* in 1822 he founded the *Société Asiatique* of Paris, of which he was perpetual secretary; in the following year he was chosen a member of the Asiatic societies of London and of Calcutta; and in 1824 he was appointed curator of the oriental department in the bibliothèque royale. He died of cholera at Paris, June 4, 1832, at the early age of 44.

REMY, or **REMI**, SAINT (Lat. *Remigius*), a saint of the Roman Catholic church, was born of a noble family of Laon, in Picardy, in the year 438 or 439. He was appointed, against his will, at the early age of 22, to the bishopric of Rheims, and his episcopate is memorable for the conversion of Clovis, who was baptized by Remy. It was on occasion of this ceremony that, contrasting our Lord and his cross with the idols whom Clovis had hitherto adored, Remy used the words which afterward became almost epigrammatic: "Adore henceforward what thou hast hitherto burned, and burn that which thou hast adored." Remy lived to see Gaul almost entirely Christianized, and died in his 93d or 94th year in 533. Some of his letters are preserved in the *Bibliotheca Patrum*, as also two documents under the title of *Testamenta*, the genuineness of which has been the subject of a curious controversy.

RENAIS'SANCE, the name given to the style of art, especially architecture, in Europe, which succeeded the Gothic, and preceded the rigid copyism of the classic revival in the first half of the present century. Under the heading ITALIAN ARCHITECTURE we have traced the rise and progress of the renaissance in the country of its birth. The spread of classical literature during the 15th and 16th c. created a taste for classic architecture in every country in Europe. France, from her proximity and constant intercourse with Italy, was the first to introduce the new style n. of the Alps. Francis I. invited Italian artists to his court during the first half of the 16th century. The most distinguished of these were Leonardo da Vinci, Benvenuto Cellini, Primaticcio, and Serlio. These artists introduced Italian details, and native architects applied them to the old forms to which they were accustomed, and which suited the purposes of their buildings, and thus originated a style similar to, though diverse from, that of Italy.

The Italian buildings were chiefly churches, St. Peter's being the great model. In France (as in the other countries n. of the Alps) the stock of churches was more than was required. The grand domestic buildings of Florence and Rome were actually needed for defense, and were founded in design on the old mediæval castles which the nobles occupied within the cities. The domestic architecture of France is rather taken from the luxurious residences of the monks, and although very graceful in outline and in detail, its buildings want the force and grandeur of the Italian palaces.

In the French renaissance, so much are the old Gothic forms and outline preserved, that the buildings of Francis I. might, at a short distance, be mistaken for Gothic designs, although, on nearer approach, all the details are found to be imitated from the classic. Such are the palaces of Chambord and Chenonceaux on the Loire, Fontainebleau, and many others. The churches of this period are the same in their principles of design. Gothic forms and construction are everywhere preserved, while the detail is as near classic as the designers could make it. St. Eustache, in Paris, is one of the finest examples of this transitional style.

From the middle of the 16th to the middle of the 17th c. a style prevailed which may be said to have combined all the defects of the renaissance. It was neither classic nor Gothic. It had no principles of construction or decoration save the individual caprice of the designer. This style, usually known as that of the time of Henry IV., is the basest which has been adopted in France, and has no redeeming qualities. It may be distinguished by the constant use of meaningless pilasters, broken entablatures, curved and contorted cornices, architraves, etc., all applied so as to conceal rather than to mark and dignify the real uses of the features of the buildings. The Tuileries, wrecked by the commune, showed all these defects. From this debased and meaningless style architecture gradually recovered, and during the 18th c. a style more becoming the dignity and importance of the *grand monarque* was introduced. The classic element now began to prevail, to the entire exclusion of all trace of the old Gothic forms. Many very large palaces are built in this style; but, although grand from their size, and striking from their richness and luxuriance, they are frequently tame and uninteresting as works of art. The palace of Versailles (q.v.) is the most prominent example. The two Mansards, one of whom designed Versailles, had great opportunities during this extravagant epoch. Their invention of giving a row of separate houses the appearance of one palace, which has ever since saved architects a world of trouble, was one of the most fatal blows which true street-architecture could have received. The e. front of the Louvre, designed by Perrault, is one of the best examples of the style of the age. Many elegant private hotels and houses in Paris were erected at this period. The most striking peculiarity of the style of Louis XIV. is the ornament then used, called rococo (q.v.).

The classic renaissance was completed in the beginning of the present century by the literal copyism of ancient buildings. Hitherto, architects had attempted to apply classic architecture to the requirements of modern times; now they tried to make modern wants conform to ancient architecture. In the Madeleine, for instance, a pure peripteral temple is taken as the object to be reproduced, and the architect has then to see how he can arrange a Christian church inside it! Many buildings erected during the time of the empire are no doubt very impressive, with noble porticoes and broad blank walls; but they are in many respects mere shams; attempts to make the religious buildings of the Greeks and Romans serve for the conveniences and requirements of the 19th century.

This has been found an impossibility—people have rebelled against houses where the window light had to be sacrificed to the reproduction of an ancient portico, and in which the height of the stories, the arrangement of the doors, windows, and. in fact, all the features were cramped, and many destroyed. The result has been that this cold and servile copyism is now entirely abandoned, and the French are working out a free kind of renaissance of their own, which promises well for the future; and is at the present moment, as the streets of Paris testify, the liveliest and most appropriate style in use for modern street-architecture.

In Spain the renaissance style took early root, and from the richness of that country at the time, many fine buildings were erected; but it soon yielded to the cold and heavy "Greco-Romano" style, and that was followed by extravagances of style and ornament more absurd than any of the reign of Louis XIV. The later renaissance of Spain was much influenced by the remnants of Saracenic art which everywhere abound in that country.

In England as in the other countries of Europe, classic art accompanied the classic literature of the period; but, being at a distance from the fountain-head, it was long before the native Gothic style gave place to the classic renaissance. It was more than a century after the foundation of St. Peter's that Henry VIII. brought over two foreign artists—John of Padua and Havenius of Cleves—to introduce the new style. Of their works we have many early examples at Cambridge and Oxford, in the latter half of the 16th century.

Longleat, Holmby, Wallaton, and many other county mansions, built toward the end of the 16th c., are fine examples of how the new style was gradually introduced.

The course of the renaissance in England was similar to its progress in France; it was even slower. Little classical feeling prevailed till about 1620. The general expression of all the buildings before that date is almost entirely Gothic, although an attempt is made to introduce classical details. The pointed gables, mullioned windows, oriels and dormers, and the picturesque outlines of the old style, are all retained long after the introduction of quasi-classic profiles to the moldings. This style, which prevailed during the latter half of the 16th c., is called Elizabethan, and corresponds to the somewhat earlier style in France of the time of Francis I. This was followed in the reign of James I. by a similar but more extravagant style called Jacobean, of which Heriot's hospital is a good example; the fantastic ornaments, broken entablatures, etc., over the windows being characteristic of this style, as they were of that of Henry IV. in France.

The first architect who introduced real Italian feeling into the renaissance of England was Inigo Jones. After studying abroad he was appointed superintendent of royal buildings under James I., for whom he designed a magnificent palace at White hall. Of this only one small portion was executed (1619–21), and still exists under the name of the banqueting house, and is a good example of the Italian style. Jones also erected several elegant mansions in this style, which then became more generally adopted.

In the latter half of the 17th c. a splendid opportunity occurred for the adoption of the renaissance style after the great fire of London. Sir Christopher Wren rebuilt an immense number of churches in that style, of which St. Paul's (q.v.) was the most important. The spire of Bow church and the interior of St. Stephen's, Wallbrook, are also much admired.

During the 18th c. classic feeling predominated, and gradually extended to all classes of buildings. In the early part of the century Vanbrugh built the grand but ponderous palaces of Blenheim and castle Howard, which have a character and originality of their own. To these succeeded a vast number of noblemen's mansions, designed by Campbell, Kent, the Adamses, and others.

Many of these, like the contemporaneous buildings of France, are of great size and magnificence; but they are usually tame and cold in design, and a sameness pervades them all. They generally consist of a rustic basement-story, with a portico over the center, and an equal number of windows on either side. The portico is considered essential, and although perfectly useless, the light and convenience of the house are invariably sacrificed for it.

The further study of the buildings of Greece and Rome led, in the beginning of the present century, to the fashion of reproducing them more literally. All important public buildings were now required to be absolute copies of ancient buildings, or parts of them, or to look like such, and then the architect had to work out the accommodation as best he might. St. Pancras's church in London is a good example. It is made up of portions from nearly every temple in Greece! Many really successful buildings, such as St. George's hall, Liverpool, the high school and royal institution in Edinburgh, have been erected in this style; but they owe their effect not to their being designs well adapted to their requirements, but to the fact that they are copies from the finest buildings of antiquity.

Sir Charles Barry was the first to break away from this thraldom, and to return to the true system of designing buildings—those, namely, which have their general features arranged so as not only to express the purposes they are intended to serve, but in so doing to form the decorative as well as the useful features of the buildings. The Traveler's club-house and Bridgewater house in London are admirable specimens of his design. There are no superfluous porticoes or obstructive pediments, but a pleasing and reasonable design is produced by simply grouping the windows, and crowning the building with an appropriate cornice.

As already noticed, a similar style of domestic architecture is now being worked out in France; but both there and in this country there has been a reaction against everything classic, and a revival of mediæval architecture has superseded that of classic, especially in ecclesiastical buildings. A very large number of churches has been erected within the last 20 years in the Gothic style, but it cannot be said that these are usually well adapted to the modern Protestant service. The most magnificent example of this style is the palace or houses of parliament at Westminster.

In Germany, Russia, and every country of Europe, the renaissance prevailed in a manner similar to that above described. In Germany there are few specimens of early renaissance, the picturesque castle of Heidelberg being almost unique as an early example. The Zwinger and the Japanese palace at Dresden, which are nearly alone as edifices of the beginning of the 18th c., show how poor the architecture of Germany then was. In the domestic buildings of Nuremberg, Dresden, and other towns of the n. of Germany, there are many instances of the picturesque application of classic detail to the old Gothic outlines.

One of the most striking examples of the revival of classic art occurred in Bavaria during the first half of the present century, under the auspices of King Louis. He caused all the buildings he had seen and admired in his travels to be reproduced in Bavaria. Thus, the royal palace is the Pitti palace of Florence on a small scale; St. Mark's at Venice is imitated in the Byzantine chapel-royal; and the Walhalla, on the banks of the Danube, is an exact copy (externally) of the Parthenon. The finest buildings of Munich are the picture-gallery and sculpture-gallery by Klenze, both well adapted to their purpose, and good adaptations of Italian and Grecian architecture.

In Vienna and Berlin there are many examples of the revived classic and Gothic styles, but the Germans have always understood the former better than the latter. The museums at Berlin, and many of the theaters of Germany, are good examples of classic buildings.—The domestic architecture of Berlin is well worthy of notice, many of the dwelling-houses being quite equal in design to those of Paris.

Of the other countries of Europe the only one which deserves remark for its renaissance buildings is Russia. St. Petersburg is, of all the cities of Europe, the one which best merits the title of a city of palaces. From the date at which the city was founded, these are necessarily all renaissance in character. They are nearly all the works of German or Italian architects, and are unfortunately, for the most part, in the coldest and worst style. The ornaments of the palaces are chiefly pilasters running through two stories, with broken entablatures, etc., and ornaments of the flimsiest rococo. The new museum, by Klenze, is, however, a marked exception.

Along with architecture, during the period of the renaissance, painting and sculpture (q.v.) and all the other arts took their models from the classic remains which were so carefully sought for and studied. All ornamental work, such as carving, jewelry, and metal-work of all kinds, followed in the same track. Mediæval niches and pinnacles gave place to the columns and entablatures of the classic styles, and the saints of the middle ages yielded to the gods and goddesses of ancient Rome.

RENAIX', a t. of Belgium, in the province of e. Flanders, picturesquely situated, 24 m. by railway s. of Ghent. Brewing, tanning, distilling, and salt-refining are carried on: and fine linen and damasks, woolen fabrics, hats, and tobacco are extensively manufactured. Pop. '70, 12,300.

RENAN, Joseph Ernest, a renowned French theologian and orientalist, was b. in 1823 at Tréguier (Côtes-du-Nord). His first education he received at the hands of the priests who directed the school of his native place. At 16 years of age he was sent to Paris, where he entered the seminary of Abbé Dupanloup to prepare himself for the church. Three years later he went to Issy, and, having completed his philosophical studies there, to St. Sulpice. On leaving this, however, he declared himself unable to follow out the path traced for him. The theological and linguistical studies, to which he had devoted himself with rare industry, had led him to results which did not seem to allow him the exercise of priestly functions in his church. He took the place of *répétiteur* in a school, and here prepared himself for an academical career. In 1847 his memoir *Sur les Langues Sémitiques* ("On the Semitic Languages") obtained the Volney prize; and the following year, another memoir of his, *Sur l'Etude du Grec dans l'Occident au Moyen Age* ("On the Study of Greek in the West during the Middle Ages"), was crowned. In 1848 he began to publish a periodical, *La Liberté de Penser* ("Liberty of Thought"), in which he embodied some of his most brilliant essays on theology, philosophy, philology, history, and the many variegated branches of his studies, which, however, were all merely preparatory to the great work for which he concentrated all his energies—viz., the investigation of the origin of Christianity, which, according to him, is as human and natural, and has grown out of the history and circumstances of the times in precisely the same manner as any other event in the records of humanity. His memoir, *Sur les Langues Sémitiques*, he expanded in 1855 into a *Histoire Générale des Langues Sémitiques* ("General History of the Semitic Languages"), which, with all its shortcomings, is the most methodical and brilliant compilation on the subject. Of the variety of subjects to which he devoted his time besides, his numerous contributions to the *Revue des Deux Mondes* and the *Journal des Débats*, bear ample witness. In 1850 he published a historical essay, *Sur Averroes et l'Averroisme*, for which he had collected materials on a scientific journey to Italy. In consequence of this he was appointed *employé* at the imperial library in Paris. He further produced translations of Canticles and the book of Job, with introductions and commentaries (*Le Cantique des Cantiques*, etc., 1860, et *Le Livre de Job*, etc., 1859). In 1860 he was sent by the emperor on a tour of exploration to Syria and Phenicia, the results of which were given to the world in the *Mission de Phenice* (1864) and other works. On his return he was elected to the chair of Hebrew professorship at the collége de France; but his inaugural lecture made him, through its too free handling of theological matters, so obnoxious to those in power, that his course was first suspended, and finally his professorship was taken from him. His work, *La Vie de Jésus*, forming Part I. of his *Origines du Christianisme*, created a profound emotion throughout Europe. An abstract of it, in a more popular form, has been published by him under the title *Jésus*. *Histoire des Apôtres* (1866), *Saint-Paul* (1869). *Antichrist* (1873), and *La seconde Génération Chrétienne: Les Evangiles* (1877), are the subsequent parts in the series. Other works are: *Etudes d'Histoire Religieuse* (1856); *Essais de Morale et de Critique* (1859); *La Réforme Intellectuelle et Morale* (1872); *Dialogues et Fragments Philosophiques* (1876); *Mélanges d'Histoire et de Voyages* (1878); and his curious poem *Caliban* (1878). Renan was elected a member of the academy in 1878.

RENDEL, JAMES MEADOWS, 1799–1856; b. England, constructed many bridges, including floating bridges with steam power. His most famous engineering works are the harbors at Portland and Holyhead, and the bridge over the Laira in Plymouth harbor.

RENDSBURG, a fortified t. in the Prussian province of Sleswick-Holstein, stands at the point of junction of the river Eider and the Kiel canal, 67 m. n.n.w. of Altona by railway. Rendsburg is favorably situated for commerce, and carries on an active trade in timber. Pop. '75, 11,406.

RENÉ or RENATUS I., surnamed "the good," titular king of Naples and Sicily, the son of Louis II., duke of Anjou and count of Provence, was b. in 1408 at Angers. René's paternal grandfather, Louis I., duke of Anjou, and second son of John the good, king of France, had been adopted in 1380 by Joanna I., queen of Naples, as her successor; and on his death, a few years afterward, his son, René's father, was crowned king of Naples and Sicily. He, however, did not derive any substantial advantages from this recognition of his presumed rights; and when, on his death and that of his eldest son, Louis II., René, as the next heir, endeavored to make good his pretensions to the great Neapolitan heritage, he found himself involved in disastrous disputes with numerous other aspirants to the coveted throne. René had married Isabella of Lorraine, and through her was also a claimant of the rich territories of Lorraine, and consequently brought upon himself the enmity of his wife's brother-in-law, the duke of Burgundy, who laid equal claim to the heritage of the ducal house of Lorraine. The best years of René's life were spent in the fruitless effort to establish these pretensions; but when, in 1442, his powerful rival, Alfonso of Aragon, took Naples, after a protracted siege, the struggle was virtually decided; and René recognizing at length the futility of his schemes, retired to his hereditary dominions in Provence, and thenceforth occupied himself with the administration of his territories, and with the cultivation of poetry and painting, in both of which he attained a degree of proficiency above the average of his age, as is shown by the poems and illuminated illustrations by his hand still preserved in the imperial library at Paris. In 1445 René gave his beautiful daughter Margaret in marriage to Henry VI. of England, and at the same time obtained from his royal son-in-law the restitution of Anjou and Maine, which had remained in the hands of the English since the successful wars of Henry V. This did not, however, prevent René from taking part in the wars of Charles VII. against the English in 1449; but after a brief stay with the army, René, wearied with the excitement and discomforts of war, retired to Aix in Provence, where for many years he attracted to his court the cultivators of song and romance, while he encouraged manufactures, and augmented the resources of the province by the introduction of improved methods of agriculture, and the importation of various useful trees and plants, and died in 1480, universally regretted by his subjects, among whom the memory of "the good king René" was long held in great veneration. René's sons had died before him; and so with him the house of Anjou became extinct, its territorial dominions lapsed to the French crown, and have since that period formed an integral part of France.

RENEWAL of a bill of exchange is matter of agreement between the parties, and a new bill is granted by the party liable to pay in substitution for the old one. The result is, that the former bill is suspended in its operation till the renewed one arrives at maturity. But the former one is not extinguished, for it revives if the renewed bill is not paid; and even though the renewed bill is paid, an action may be brought on the former bill to recover the interest due upon it.

RENFREW, a co. in n.e. Ontario, embracing Allumette island, having the Ottawa river for its n. and n.e. boundary; 17,040 sq.m.; pop. '71, 29,768. It is intersected by the Brockville and Ottawa railway, which terminates within its limits. Its surface is hilly and largely covered with heavy timber, which is the chief article of export and source of industry. It is drained by a large number of lakes and rivers, among them the Bonnechere and the Muskrat, which furnish extensive water-power. Its manufactories include axe factories, woolen mills, lumber mills, and grist-mills. Co. seat, Pembroke.

RENFREW (anciently *Strathgryffe*), a co. in Scotland, 31 m. long, by 13 broad, is bounded on the n. and w. by the river and Firth of Clyde, on the s. by Ayrshire, and on the e. and n. by Lanarkshire. Area, 254 sq.m., or 162,428 acres; pop. '61, 177,561; '71, 216,947.

Renfrew is very unequal in its surface, and consequently in the nature and quality of its soil; the highest portion of it, composing two-thirds of its surface, reaches to a height of 1240 ft above the level of the sea, and gradually declines to a level extending to some 12,000 acres. Renfrew was divided in 1815 into the upper and lower wards, with a sheriff-substitute for each. Owing to the great demand for dairy produce in the large towns in or near the county, nearly two-thirds of the arable land is kept under grasses. There are extensive mineral deposits in the county, employing a large number of people, and constituting a great source of commerce and wealth. The minerals wrought are coal (accompanied always by iron), limestone, and sandstone. In respect of commercial and manufacturing importance Renfrew is second only to Lanark of Scotch counties. The manufacture of soft goods, comprising silk, cotton, and muslin fabrics, is carried on to a great extent. The center of these branches of industry is Paisley; but weaving is carried on in almost every village in the county. The good roads and railways, together with the seaports of Greenock and Port Glasgow, afford ready means of transit both for home and foreign trade. The chief towns, besides these ports, are Renfrew (q.v.), Paisley (q.v.), and Johnstone (q.v.). Besides the Clyde, and some small streams, there are three rivers of considerable size, called the Black Cart, the White Cart, and the Gryffe. Of the whole acreage of Renfrew there were, in 1876, 92,994 acres under all kinds of crops: 18,187 acres were under corn crops, 7,360 under green crops, 18,556 in clover and grasses under rotation, and 48,582 in permanent pasture. There were in the co. in the same year 3,128 houses kept for agricultural purposes, 25,090 cattle, 32,909 sheep, and 1917 pigs. The valued rent in 1674 was £69,172 Scots, or £5,764. The valuation for 1878–79 was £643,906, exclusive of railways and public works, valued at £78,684. The parliamentary constituency, returning one member, in 1878–79 was 5,872.

Renfrew was the chief patrimony of the Stewards of Scotland, granted to them in 1404 by Robert III., since which time the eldest son of the reigning sovereign has borne the title of baron of Renfrew.

RENFREW, an ancient royal parliamentary and municipal burgh, capital of the county of the same name, stands on the s. bank of the Clyde, 6 m. w.n.w. of Glasgow. It contains an educational institution called the Renfrew grammar school and Blythswood testimonial, which was originally endowed by charter of Robert III., and is in part maintained by the town council. On the banks of the Clyde is a wharf, at which the Glasgow steamers touch. Silk and muslin fabrics are woven; and many of the inhabitants are employed in iron-works and in ship-building, which branches of industry have within recent years become important here. Pop. '61, of royal burgh, 3,412; '71, 4,163.

RENI, a t. of Bessarabia, at the confluence of the Pruth and the Danube, on the left bank of both rivers. It carries on a considerable trade, exporting large quantities of grain. Pop. about 8,000.

RENNEL, JAMES, a well-known English geographer, was b. near Chudleigh, Devonshire, 1742, and entered the navy as a midshipman at the age of 15, distinguishing himself under admiral Parker at the siege of Pondicherry. At the age of 24 he left the navy, and enlisted as an officer of engineers in the East India company's army, rising through the influence of his distinguished services under Clive to the grade of maj. Soon afterward he was transferred to the post of surveyor-general of Bengal, an office more in keeping with his tastes. While serving in the army he had prepared and published a *Chart of the Bank and Currents of Cape Agulhas* (1768), which attracted the general notice of geographers; and having retired from office (1782) with a pension of £600, he followed up this work by a succession of geographical works on India, the chief of which was *Memoirs of a Map of Hindustan* (Lond. 1783), new editions of which appeared in 1788, 1793, and 1800, each of which merits to be considered a distinct work. But his geographical investigations took a wider scope, for in 1792 he published a *Memoir of the Geography of Africa*, from the communications of maj. Houghton, and the relations of Ledyard and Hornemann; and in 1798 he aided Mungo Park in the arrangement of his travels, illustrating them by a map. Rennel had been elected a member of the royal society in 1788. The subject of the correctness of the ancient geographers being at that time much discussed, Rennel, though wholly ignorant of Greek, undertook the vindication of Herodotus (whose works he became acquainted with through the medium of a translation), and published in 1800 his *Geographical System of Herodotus Examined and*

Explained, a work of unrivaled merit, displaying as it does one of the grandest combinations of acuteness, sagacity, and research. A second edition was published in 1830. In 1814 appeared his *Observations on the Topography of the Plain of Troy;* and two years afterward *Illustrations (chiefly Geographical) of the Expedition of the Younger Cyrus, etc., and of the Retreat of the Ten Thousand.* After his death, which took place at London, Mar. 29, 1830, there were found among his papers several MS. works, including the *Investigation of the Atlantic Currents and those between the Atlantic and Indian Oceans* (Lond. 1832), in the composition of which book he examined the logs of all the ships of war and Indiamen which had traversed those seas for about 40 years previous, and reduced their observations to a general system; and *A Treatise on the Comparative Geography of Western Asia*, with an atlas, ancient and modern (Lond. 1831), a work of great labor and research, which had been prepared by the royal command, and the publication of which was partially defrayed at the king's expense. Rennel was one of the most remarkable men of his time: his works exhibit throughout the most earnest perseverance and industry, sound judgment, and wonderful sagacity.

RENNES (*Redones* of the Romans, *Condate* of the Gauls), formerly the capital of the province of Bretagne, now the chief town of the dep. of Ille-et-Vilaine, is situated at the confluence of the rivers Ille and Vilaine. It is divided into the upper or new town, and the lower or old town. It is surrounded by ancient walls, flanked with towers, beyond which lie extensive suburbs. Three bridges unite the two divisions of the town, the older portions of which lie on the left bank of the Vilaine, and are often exposed to serious damage from inundations. The most noteworthy of the public buildings are the modern cathedral, whose interior is a very spacious hall of Grecian architecture; the stately palais de justice; the hôtel de ville; and the lycée. Rennes is the see of a bishop, and the seat of a high court of jurisdiction for Ille-et-Vilaine and several other adjacent departments, and has tribunals of first instance and of commerce. As the focus of main and branch-lines of railway between Paris and the n.w. of the empire, and commanding good river and canal navigation, Rennes is favorably situated for commerce; and in addition to the transport of the abundant farm produce of the neighboring districts, it carries on a considerable trade in its own manufactures, which include cotton and linen yarns, flannel stockings, lace, sail-cloths, earthenware, etc. Rennes was all but reduced to ashes by a great fire in 1720. Pop. '76, 53,598.

RENNET consists of the inner lining of the true stomach (see DIGESTION) of the sucking-calf, and depends for its use upon the acid gastric juice contained in it. It is prepared by removing the stomach from the animal as soon as killed, and scraping off the outer skin and all superfluous fatty matter. The membrane is then salted for some hours, and stretched out to dry. If perfectly dried, it will keep for a long time. When used, a small piece is taken and soaked in a little whey or water, and then added to the milk intended to be curdled.

RENNET, the common name, not only in English, but, with slight modifications, in French, German, and other languages, of a class of apples, including many of the most beautiful and pleasant varieties. They are of very regular and nearly globose shape; their skin has generally a rusty tinge, and often a kind of unctuousness to the touch; their flesh is finely granular; and besides being sweet and agreeably acid, they have a peculiar aromatic flavor. They do not keep well. The trees have a very regular habit of growth, and are very suitable for dwarf standards. The name rennet seems to be originally French—*reinette*, little queen.

RENNIE, GEORGE, an eminent English civil engineer, and the eldest son of JOHN was born in Surrey, Jan. 3, 1791, and at the age of 16 entered the Edinburgh university, being placed under the charge of prof. Playfair, in whose house earl Russell, then an Edinburgh student, also at that time resided. After attending a course of classics, mathematics, chemistry, and natural philosophy, he returned to London in 1811, and commenced the practical study of engineering under his father. In 1818 he was appointed the superintendent of the machinery of the mint, and at the same time aided his father in the planning and designing of several of his later works. After his father's death in 1821, Rennie entered into partnership with his younger brother, John (afterward sir John Rennie), as engineers and machinery constructors; and during the existence of the firm it carried on an immense business, including the execution of most of the works which had been planned by the elder Rennie, and the completion of those which he had left unfinished. Their operations included the construction of bridges, harbors, docks, ship-yard and dredging machinery, steam factories, both in Great Britain and on the continent, and many of the great naval works at Sebastopol, Cronstadt, Odessa, Nicolaiev, and in the principal ports of England; they also made the coining machinery for the mints at Calcutta, Bombay, Lisbon, Mexico, and Peru; the biscuit, chocolate, and flour-mills at Deptford, Gosport, and Plymouth; and furnished marine engines for the war-ships of England, Russia, France, Italy, Mexico, etc. Besides these multifarious labors, they built ships both of wood and iron, drained large tracts of land in the midland counties of England, and Rennie superintended the construction of several continental railways. He was elected a fellow of the royal society in 1822, and was subsequently enrolled in similar societies at Dublin, Turin, Rotterdam, etc. He is the author of "Experiments on the Strength of Materials," "The Frictions of Solids," and

"The Frictions of Fluids," published in the *Philosophical Transactions.* He also contributed memoirs to the *Transactions* of the civil engineers. He died March 30, 1866. His brother, sir JOHN, was knighted on the occasion of the opening of the new London bridge (1831), which he executed from his father's designs. He designed and executed Southwark and Waterloo bridges, and completed the drainage of the Lincolnshire coast, begun by his father. He died 1874.

RENNIE, JOHN, an eminent civil engineer, was born at Phantassie, near East Linton, East Lothian, June 7, 1761. His preliminary education was obtained at the parish-school of East Linton, and supplemented by two years at Dunbar, where he was indoctrinated into pure mathematics. After being for some time a workman in the employment of Mr. Andrew Meikle, celebrated in connection with the thrashing-mill (q.v.), he proceeded to Edinburgh, where he attended the lectures on natural philosophy by Dr. Robison, and those on chemistry by Dr. Black (q.v.). Furnished with a recommendation from prof. Robison, he visited (1780) the works of Messrs. Boulton & Watt at Soho, near Birmingham, and was immediately taken into employment by that eminent firm. Here his mechanical genius soon displayed itself; and so highly did Watt esteem Rennie, that he gave him, in 1789, the sole direction of the construction and fitting-up of the machinery of the Albion mills, London; and the ingenious improvements effected in the connecting wheel-work were so striking, that Rennie at once rose into general notice as an engineer of great promise. Abundance of mill-work now flowed in upon him, and the thorough efficiency of his workmanship greatly contributed to his fame. To this branch of engineering he added, about 1799, another—the construction of bridges; and in this branch also his pre-eminent talent and ingenuity displayed themselves. The elegance and solidity of his constructions, the chief of which were raised at Kelso, Leeds, Musselburgh, Newton-Stewart, Boston, New Galloway (and at other places afterward mentioned), were universally admired; Rennie's greatest work in this department was the Waterloo bridge over the Thames, said to be the noblest structure of its kind in the world, and it certainly combines in the happiest proportions the qualities of grandeur and simplicity. It was commenced in 1811, and finished in less than six years, at a cost of more than £1,000,000. Another of his works is the Southwark bridge, which was built on a new principle, cast-iron arches resting on stone piers, and was finished in four years at an expense of £800,000. He also drew up the plan for the London bridge, which, however, was not commenced till after his death. We have only space to enumerate the rest of his great engineering achievements: he superintended the execution of the Grand Western canal in Somerset, the Polbrook canal in Cornwall, the canal joining the Don and Dee in Aberdeen, that between Arundel and Portsmouth, and chief of all, the Kennet and Avon canal between Newbury and Bath. The London docks, the East and West India docks at Blackwall, with their goods' sheds, the Hull docks, the Prince's dock at Liverpool, and those of Dublin, Greenock, and Leith, were all designed, and wholly or partially executed under his superintendence. He also planned many improvements on harbors and on the dockyards of Portsmouth, Chatham, Sheerness, and Plymouth; executing at the last-mentioned port the most remarkable of all his naval works, the celebrated breakwater. Rennie died Oct. 16, 1821, and was buried in St. Paul's cathedral. Rennie's great merit as an engineer consisted in his almost intuitive perception of what was proper to be done to effect the assigned purpose. Another striking characteristic of his works is the remarkable combination in them of beauty and durability. In this respect, Rennie had no rival; and though his works are frequently objected to on the ground of their expensiveness, yet their lasting qualities will in the end more than compensate for this. In person Rennie was of extraordinary stature and herculean strength—characteristics which have for a lengthened period distinguished his family, and with reference to which numerous tales are still current regarding many of his relatives.

RENO, a co. in s. Kansas; drained by the Arkansas and Good rivers; traversed by the Atchison, Topeka and Santa Fé railroad, 1260 sq. m.; pop., '80, 12,824—11,395 of American birth; 79 colored. The surface is mostly prairie and fertile; wheat, oats, corn, potatoes, and dairy products are the staples. Co. seat, Hutchinson.

RENO, JESSE L., 1823–62; b. Va.; graduated at West Point, 1846; was present at the Mexican battles of Cerro Gordo and Chapultepec, and for his gallantry was brevetted capt. He was assistant professor of mathematics at West Point; served in the coast survey and ordnance department, and at the outbreak of the rebellion had the rank of capt. He was made a brig.gen. of volunteers, and in Burnside's expedition to North Carolina had command of the second brigade, and distinguished himself at Roanoke Island, fort Barton, and New-Berne. In 1862 he was ordered to re-enforce McClellan, and later joined Pope's army. He commanded the 9th corps at the battle of Manassas; and at South Mountain, where he was killed, his command was in the front engaged all day, and his efforts were the means of securing victory to the federal forces.

RENSSELAER, a co. in e. New York, adjoining Massachusetts; bounded on the w. by the Hudson river; drained also by the Hoosac river and Kinderhook creek; traversed by the Troy and Boston, the Hudson River, and the Harlem Extension railroads, and other railroads centering in Troy; about 645 sq.m.; pop. '80, 115,341—88,957 of American birth. The surface is hilly. The Taghanic mountains cross the e. part. Quartz and slate are found. The soil in the valleys is fertile. The principal productions are corn, wheat, oats, hay, and flax. The manufacturing interest is very extensive and valuable. There are great iron foundries, manufactories of agricultural tools, etc. Co. seat, Troy.

RENSSELAER POLYTECHNIC INSTITUTE, in Troy, N. Y., endowed by Stephen Van Rensselaer as a school of theoretical and practical science; organized, 1824. It has long had high reputation in its special department. The studies of the course are designed to secure to all the graduates a professional preparation, at once thorough and practical, for the following specialties of engineering practice: the location, construction, and superintendence of public works, as railways, canals, water-works, etc.; the design, construction, and management of mills, iron-works, steel-works, chemical works, and pneumatic works; the design and construction of roofs, arch bridges, girder bridges, and suspension bridges; the design, construction, and use of wind motors, hydraulic motors, air-engines, and the various kinds of steam-engines; the design, construction, and use of machines in general, and the determination of their efficiency; the survey of rivers, lakes, and harbors, and the direction of their improvements; the determination of latitude, longitude, time, and the meridian in geographical explorations, or for other purposes, together with the projection of maps; the selection and test of materials used in construction; the construction of the various kinds of geometrical and topographical drawings. The site of the institute buildings on the eastern slope of the city combines the advantages of a commanding position and quiet surroundings with great convenience of access. The observatory occupies an elevated site, and commands a good horizon. It consists of a central or main building, 30 ft. sq., and 3 wings; the total length being 76 ft., and the breadth 60 feet. It is surmounted by a dome, under which is the large pier designed for an equatorial telescope. The e. wing contains piers for the meridian circle and its collimators, and the transit instrument. The other wings are to contain the computing and clock rooms, and library. In the Winslow laboratory building are the metallurgical laboratory and the chemical laboratory and lecture-room. The collection of minerals, shells, herbs, and woods, from all parts of the world, is very large; the metallurgical collection is rich; the chemical cabinet contains specimens illustrating all the principal manufactures involving chemical science. The library contains many valuable scientific works. It has recently been increased by a valuable collection of American and foreign scientific periodicals, and is accessible to all the members of the institute. It had (1878) 18 teachers and 166 students. Hon. James Forsyth, president.

RENT, in political economy, is a term applied to the profits drawn from land, houses, or other immovable property, termed in England "real property." It is colloquially applied to these profits only when the property is hired by a tenant who pays for the use of it. It was long before a distinction was made between such letting and hiring and that of any other commodity, such as a ship or a wagon. But political economists found that there was a fundamental distinction, affecting large questions not only in political economy but in state politics. These are connected with the specialty that other profits, whether from the letting of articles or otherwise, arise out of the acts of those to whom the articles belong; but the rent of land is a fund that exists through external causes, over which the owner has no control, and in certain conditions *must* exist whoever may draw it. When "the theory of rent," as it was termed, dawned upon the economists, and was but partially seen, they developed it in different formulas, which appeared to be different theories, but in reality were crude forms, tending, though complicated in themselves, to the simple principle, that the pressure of population on the means of subsistence creates rent on those lands where the means of subsistence can most easily be produced. In an enlarging and aggrandizing country like Britain, the phenomenon is in constant gradual operation: but it will be best illustrated by supposing an instance of sudden and extensive action. Suppose there is an island in which 1000 people find enough for their wants in the natural produce of its most fertile soil. Suddenly 500 people become added to the population, and an increase of the existing food to the extent of one-half is required. The shape in which this increase will take place will be competition, by the offer of an enhanced price for food, and that enhanced price will tempt people to bring under cultivation the inferior lands. The owners, however, of the old rich lands will not see their neighbors getting prices a third higher than themselves; they, too, will sell their produce at the market price, and the difference between this and the old value will be *rent*. It is of no moment, in the economic question of the existence of the element, that the owner of the rich soil does not let it; if he eats his bread cheaper than his neighbor, that is merely the form in which he derives the advantage of *rent*. The importance of this view, both in politics and economics, is that rent *must exist, and cannot be got rid of*. Whoever has at his command better land than the worst that is cultivated, holds rent. It is in vain, therefore, to think of destroying the "monopoly," as it is sometimes called, of land-owners; it revives as naturally by an economic law, as water finds its level by a physical law. If you were to divide all the land in Britain to-morrow in equal portions among the inhabitants, the value of it would be greatly deteriorated by the change, but in time some patches would become more valuable than others, and worth "rent," while the frugal and industrious would gradually be absorbing the portions of the idle and extravagant, and accumulating estates. In fact, to the mere consumer, it is of no moment who has the land, provided it is in the hands that can render it most productive. To this end, it is more profitable that the land of a country should be in the market, and obtainable by those who, being ready to give most for it, are able to work it to most profit. In France, where land is divided among the owner's descendants, the consequent breaking up into small patches, not necessarily in the hands of persons able or willing to cultivate them, is detrimental to the value of the land at large. On the other hand, an entail system, such as that which predominated, and still to a certain extent exists in Scotland, is detrimental, by keeping the land out of the market, and necessitating that it shall belong to a certain person, who has perhaps neither the ability nor the capital to turn it to its best purpose. In the struggle which terminated in the establishment of free trade in 1846, the "theory of rent" was referred to with much alarm, and it was said that when grain was brought from abroad, a reversal of the action creating rent would occur, from the inferior lands falling out of cultivation. Some free-traders admitted this as a necessary evil, but others said that the expansion given to commerce would increase the demand for the produce of the soil, while the home-growers would have a monopoly from their vicinity. In fact, the increase of trade and riches has been so great, that the value of land has greatly increased since the establishment of free trade, and that although half our bread stuffs come from abroad. The great increase has been in the rearing of butcher-meat, which the increased wealth of the people has enabled them to buy.

RENT, in English law, is an incident to the tenure created between a lessor and lessee. It consists not necessarily of money, but may be a quantity of corn, or a peppercorn, or a flower. Where lands are held rent-free, it is usual for the landlord to reserve some nominal rent, merely as an acknowledgment of tenancy. In the ordinary case of leases, a payment of a fixed sum of money is reserved annually for the benefit of the landlord. It is incidental to rent that the landlord can, if it is not duly paid, distrain the tenant's goods, or, indeed, any person's goods found on the premises; i.e., the landlord can seize these and sell them without any judicial authority, in order to pay the rent. No express agreement between landlord and tenant is necessary to give the landlord this power of distress. The rule is, that rent issues out of all and every part of the premises, and whatever goods are found on any part of the premises can be distrained by the landlord. Sometimes the owner of land gives a third party a right to a certain rent out of his lands, by way of security, and it is called a rent-charge; the party entitled to the rent-charge having power to distrain also for the rent, though having no other right to the lands. In Scotland, though the general rules as to rent do not substantially differ, the landlord's power of sequestration is not identical with the English power of distress. See LANDLORD AND TENANT.

RENTON, a small t. in the co. of Dumbarton, and 2 m. n. of the town of that name, on the right bank of the Leven. Smollett, the novelist and historian, was born in the neighborhood, and is commemorated by a monument in the town. Pop. '61, 2,891; '71, 8,087, who are employed in the printing, dyeing, and bleaching works on the Leven.

RENUNCIATION, as a legal term, is the renouncing or abandoning of a right. In England, the term is used solely in reference to an executor who has been nominated in a will, but who, having an option to accept it, declines to do so, and in order to avoid any liability, expressly renounces the office. This he may do by letter addressed to the court of probate.—In Scotland, the term is also used in reference to an heir, who is entitled, if he pleases, to succeed to the ownership of heritable property, but, from the extent of the incumbrances, prefers to renounce the character of heir. So the renunciation of a lease in Scotland is used in the same sense as the surrender of a lease in England.

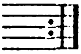
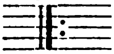
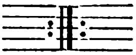
RENVILLE, a co. in n.w. Dakota, having the British possessions for its n. boundary and the Plateau du Coteau du Missouri on the s.w.; 1600 sq.m.; pop. '80 (with that of 4 other counties), 247—181 of American birth, 4 colored. It is drained by the Rivière de Lacs and the Mouse river, and has a level surface, with a soil of great productiveness very little cultivated.

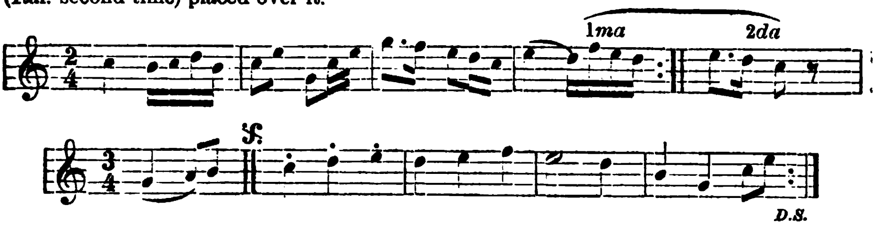
RENVILLE, a co. in s.w. central Minnesota, drained by the Minnesota river; traversed by the Hastings and Dakota railroad; about 1000 sq.m.; pop. '80, 10,791—6.556 of American birth. The surface is level, with little timber The soil is fertile. The principal productions are corn, oats, and wheat. Co. seat, Beaver.

RENWICK, JAMES, LL.D., an American author and physicist, was born about 1785, and graduated at Columbia college, New York, in 1807. In 1820 he was appointed professor of chemistry and physics in that college, a position he held until 1854. In 1838 he was appointed by the U. S. government one of the commissioners to explore the line of the boundary, then settled by the Ashburton treaty, between Maine and New Brunswick. In addition to his collegiate duties he wrote the biographies of Robert Fulton, David Rittenhouse, and count Rumford, in Sparks's *American Biography;* a *Memoir of De Witt Clinton* (1834); *Treatise on the Steam-engine* (1840–41). His text-books, *Outlines of Natural Philosophy* (1832), and *Outlines of Geology* (1838), were the first works of their kind published in the United States, and, with his other educational works, have passed through numerous editions. Renwick died in 1863.

RENWICK, James, b. New York, 1819; educated at Columbia college. He constructed the distributing reservoir of the Croton aqueduct, and was for some years an engineer on the Erie railroad. Among the buildings designed by him are Vassar college, Poughkeepsie; St. Patrick's cathedral, and Calvary church, New York; and the Smithsonian institution at Washington.

REPAIRS is the legal as well as popular term to denote the repairs done to a house or tenement by a tenant or landlord during the currency of the lease. In England the burden of repairs is at common law thrown on the tenant, so that unless the lease expressly say that the landlord is to do the repairs, the tenant will be bound, but generally the lease states who is to do the repairs; and it is only ordinary repairs that the tenant is bound to do. In the lease of farms the tenant is bound only to keep the house in repair and not the out-buildings, though he is bound to keep the fences in repair. If the landlord is bound to do the repairs and fails to do them, the tenant is not entitled to quit the premises on that account, though he will be entitled to sue the landlord for damage caused by the want of repairs. In Scotland the landlord is bound at common law to put the premises into tenantable repair at the commencement of the lease. The tenant is then bound to keep them in ordinary repair, but not to keep them in repair where some hurricane or extraordinary cause has done injury.

REPEAT, in music, a character indicating the repetition of the part or strain to which it applies. It consists of two perpendicular lines through the staff, with dots before them and between the lines of the staff—  placed at the close of the strain to be repeated. When a series of notes has to be repeated from the beginning of the piece, this sign is inserted at the place where we have to return to the beginning. But when the repetition is not from the beginning of the piece, a reversed repeat  must be placed at the point where the repetition begins, the passage to be repeated being inclosed by the two signs. When the following strain is also to be repeated, we have the dots placed on both sides of the repeating sign . When a passage of some length is to be repeated, with an alteration at the end, a curved line with the figure 1, 1*ma*, or *prima volta* (Ital. first time) is placed over the part which is to be altered, the sign of the repeat follows, and then the altered termination with 2, 2*da*, or *seconda volta* (Ital. second time) placed over it.



The words *da capo*, abbreviated D. C. (Ital. from the beginning), indicate that a piece is to be repeated from the beginning. But if that repetition is only to extend to a particular point, at which the movement or piece finally closes, that point is indicated by the word *fine* (Ital. end), or the letter F. If, however, the repetition is to begin, not from the commencement of the piece, but from another point, the sign 𝄋 is placed over the point, and the words *dal segno*, abbreviated D. S. (Ital. from the sign), are used to indicate the point after which the repetition is to begin.

REPETITION, in Scotch law, means the repayment of money which had been received by mistake or ignorance. The form of action by which money is so recovered was, in the Roman law, called *condictio indebiti*, and the law of Scotland adopts the same expression. The maxim is, that if money has been paid under some mistake as to the law, it cannot be recovered; but if it was paid under a mistake as to a matter of fact, then it may be recovered. In England the same doctrine holds, and the action is called an action for money had and received.

REPLEADER, in English law, is a right to plead again, or deliver a fresh pleading in consequence of the issue which had been joined not meeting or exhausting the real point in dispute. This right is much abridged, in consequence of the liberality now used in amending the record.

REPLEVIN, in English law, is a form of action by which goods which have been seized under an illegal distress are taken back (security being given to the amount for which the goods were distrained), and the action of replevin commenced to try the legality of the seizure.

REPLEVIN, in law (*ante*), originally used to recover chattels taken as a distress, but has come to apply to all cases of illegal taking, and is even brought in some states for the recovery of specific goods to which the plaintiff sets up title. It differs from detinue in that it rests upon an illegal taking; from the other personal actions, in that it lies to recover the specific chattels alleged to have been illegally taken. Under the writ the sheriff takes possession of the property therein specified, which he delivers to the plaintiff after the latter has given satisfactory security that he will establish his title or return the property. Judgment for the plaintiff establishes his title, and includes damages for the taking and detention. The action is brought to regain possession, and cannot be maintained if the property have been restored. It lies to recover all personal property which can be specifically distinguished from other property of the same kind; but not for things annexed to the realty, nor for papers relating to the realty.

REPLICATION, in the English common law, means the pleading of the plaintiff in answer to the defendant's plea. The plaintiff's first pleading is the declaration, which is answered by the defendant's plea, and which in turn is answered by the plaintiff's replication.

REPORTING, PARLIAMENTARY, accounts of single speeches, and, at times, of entire debates in the English parliament, have come down to us from a very early period, and in the voluminous work entitled the *Parliamentary History of England*, we possess the most valuable historical work in our language. The earlier volumes of the journals of the house of commons contain short notes of speeches, which the clerks made without the authority of the house; but all the later volumes record nothing but the votes and proceedings—the *res gestæ*, in fact. Sir Symonds d'Ewes, who may be considered our first parliamentary reporter, has left us a journal of queen Elizabeth's parliaments. The session of 1621 was also reported from notes taken by a member. The commons' journals contain notes of speeches in the parliaments of James I. and James II. Rushworth, assistant-clerk in the long parliament, 1640, took down in a species of short-hand any speech of importance, and furnished Charles I. with a copy of the king's own speech when he made the attempt to seize the five members. His account of *Remarkable Proceedings in Parliament* forms one of the most valuable portions of his *Historical Collections*. We are also indebted to Thurloe and Gray for notices of what occurred in parliament. During the reign of William III., a member now and then sent a copy of his speech to the newspapers, for printing which, however, they were sometimes called to account. In the reign of queen Anne, a monthly pamphlet, called the *Political State*, gave an outline of the debates in parliament. In the reign of George I., the *Historical Register*, published annually, professed to give reports of parliamentary speeches. The *Gentleman's Magazine* began a monthly publication of the debates, the number for Aug., 1735, containing a report of the debate in the house of lords on the previous Jan. 23. Cave, the publisher, continued the practice in succeeding numbers, and his systematic proceedings are thus described by sir John Hawkins: "Taking with him a friend or two, he found means to procure for them and himself admission into the gallery of the house of commons, or to some concealed station in the other house, and there they privately took down notes of the several speeches, and the general tendency and substance of the arguments. Thus furnished, Cave and his associates would adjourn to a neighboring tavern, and compare and adjust their notes; by means whereof, and the help of their memories, they became enabled to fix at least the substance of what they had lately heard and remarked. The reducing this crude matter into form was the work of a future day and an abler hand—Guthrie, the historian, whom Cave retained for the purpose." There was, however, no publication of the debates during the sitting of the houses; parliament was always prorogued before anything said in the course of the session was given in the magazine. At first, the names of the speakers were cautiously indicated by the first and last letter only, and in many cases the speaker's name was wholly omitted. Growing bolder by degrees, Cave printed the names at length. The house of commons soon took the alarm. The publication of the debates of either house had been repeatedly declared to be a high breach of privilege. Sir Symonds d'Ewes gives us a resolution of the lower house in the 31st Eliz. 1588, that "speeches used in this house be not any of them made or used as table-talk, or in any wise delivered in notes of writing to any persons whatever, not being members of this house." In 1698, the lords agreed to a standing order, which is still unrepealed, declaring "that it is a breach of the privilege of this house for any person whatsoever to print, or publish in print, anything relating to the proceedings of the house, without the leave of this house." The commons followed up several previous resolutions to the same effect, by ordering, in 1728, "that it is an indignity to, and a breach of, the privilege of this house, for any person to presume to give, in written or printed newspapers, any account or minute of the debates or other proceedings; that upon discovery of the authors, printers, or publishers of any such newspaper, this house will proceed against the offenders with the utmost severity." In 1738 speaker Onslow called the attention of the house to the breach of its standing orders by Cave and others. Sir Thomas Winnington exhorted the commons not to be less jealous of their privileges than the other house, which had lately punished some printers for publishing their protests. "What will be the consequence," he asked, "if you allow these reports to go on unchecked? You will have the speeches of this house every day printed, even during your session, and we shall be looked upon as the most contemptible assembly on the face of the earth." The result was another thundering resolution against the publication of debates "either while parliament is sitting or during the recess," and a threat to proceed against offenders with the "utmost severity." The reports, notwithstanding, still appeared, but under the disguise of "debates in the senate of Lilliput," in the *Gentleman's Magazine;* and "debates in the political club," in the *London Magazine.* The celebrated Dr. Johnson was employed by Cave in the composition of his parliamentary debates, and the reports from 1740 to 1743 are held to have been entirely prepared by him; sometimes with the assistance of the above-mentioned Guthrie, who had a good memory, and used to bring home as much as he could recollect from the house; and sometimes, according to Boswell, with no other aid than the names of the orators and the side they took. When it was observed to Johnson that he dealt out reason and eloquence pretty equally to both parties, he remarked; "I took care that the Whig dogs should not have the best of it." It was not till 30 years later that the parliamentary debates descended from the magazines to the newspapers. The latter had, however, for some time resolved to report the debates (Woodfall's *Junius*, iii. 345), and they took advantage of the popular excitement arising out of the Luttrell-Wilkes election for Middlesex, to try the right of the house to interdict the publication of its proceedings.

The ever-memorable contest between parliament and the press began at the close of the year 1770. The house of commons followed up another solemn threat by prompt action. Two printers, Thompson and Wheble, were ordered to attend at the bar, and, upon their contempt, were ordered into custody. On Mar. 12, 1771, complaint was made against W. Woodfall, printer of the *Morning Chronicle;* J. Miller, of the *London Evening Post;* and four other printers of London daily papers, for printing the proceedings of the house. The debates were unusually violent; there were 23 divisions: and the house did not adjourn until four A.M. The printers were ordered to attend. Some surrendered, and on asking pardon on their knees at the bar, were discharged. Miller, not surrendering, was ordered into the custody of the sergeant-at-arms. His messenger arrested Miller within the precincts of the city of London, and was immediately given into custody by Miller for assault, and carried before the lord mayor, the right hon. Brass Crosby. The deputy sergeant-at-arms attended before the lord mayor, and explained the circumstances; but his lordship declared the speaker's warrant illegal, discharged Miller from custody, and committed the messenger for assault. Wheble and Thompson had been carried respectively before aldermen Wilkes and Oliver, who immediately discharged them, and bound them over to prosecute, and the speaker's messenger to answer a charge of assault and false imprisonment. The house of commons was furious. It had had enough of Wilkes, but ordered the attendance of the lord mayor (a member of the house) in his place, and also of alderman Oliver. The aldermen of London attended the house, and pleaded their own cause, alleging that their charters exempted the citizens from any law process being served upon them except by their own officers. The house ordered its various resolutions to be read, prohibiting the reporting of its proceedings by any, even its own members, and then committed alderman Oliver to the tower. The lord mayor, who was suffering from gout, was excused from further attendance that day, but Wilkes was ordered to attend at the bar on April 8. The defiant alderman was ready for the fray, but the house evaded the meeting by adjourning from the 7th to the 9th. The lord mayor, on the 27th, was sent to join alderman Oliver in the tower. The city of London loudly protested against the arbitrary proceedings of the house, and the whole country responded to the appeal. The power of parliament to imprison ceases at the end of the current session, and on the day of prorogation, July 23, the lord mayor and alderman Oliver marched out of the tower in triumph, and at night the city was illuminated. A few days afterward, the speaker's messenger who had arrested Wheble was tried at Guildhall for the assault, found guilty, fined 1*s.*, and imprisoned for two months in the Compter. Next session, the house of commons tacitly acknowledged itself beaten. The printers defied the house, continued to publish their proceedings, and slept, notwithstanding, secure in their beds. In a short time, the house of lords also conceded the point. The victory was complete, and no attempt has since been made to restrain the publication of the debates and proceedings of parliament. The resolution affirming that it is a high indignity to, and "notorious breach of, the privileges of the house to publish the debates," still remains unrevoked on the journals. Although debates are now daily cited in parliament from printed reports, and galleries have been constructed for the accommodation of the reporters, yet for some years after the triumph of the press, the gallery of the lower house was occasionally shut during debates. During the American war, the public were more than once excluded from the gallery for a whole session. It is still in the power of any member, who may call the speaker's attention to the fact that "strangers are present," to exclude the public and the reporters from the house. The power has frequently been exercised during living memory, but on such occasions some one or more members who have dissented from this course have taken notes of the speeches, and have avowedly sent them to the newspapers.

The old machinery of newspaper reporting was susceptible of immense improvement. One of the Woodfalls (a brother of the Woodfall of Junius) had so retentive a memory that he went by the name of "Memory Woodfall." When editor of the *Morning Chronicle*, he used to listen to a debate in the gallery, and write it out next day, the taking of notes being at that time forbidden. The employment of only one reporter for the whole night necessarily caused great delay in the publication of the paper, Woodfall's journal sometimes not being ready until nine or ten o'clock at night. The first great improvement was made by Mr. Perry, a native of Aberdeen, who succeeded Woodfall in the management of the *Morning Chronicle*. He established a corps of parliamentary reporters to attend the debates of both houses every night in succession. He thus brought out the night's debate on the following morning, anticipating his rivals by ten or twelve hours. The superior excellence of the reports thus obtained, as well as their more rapid publication, soon made the new system universal. The improvement in the reports of the debates from the period of the American war until the year 1815, was but gradual. At the close of the war, however, public attention being directed with almost exclusive anxiety to domestic affairs, the publication of parliamentary debates became an object of national importance, and in the course of a few years assumed its present full, detailed, and accurate character. Increased facilities for the discharge of their important and arduous duties were from time to time given to the reporters. Formerly, they had no means of entering the strangers' gallery except those which were common to the public generally. On days when an interesting debate was expected, they were obliged to take their places on the stairs early in the forenoon, and, after standing there for many hours, to depend for their chance of getting in by battling their way in the crowd when the door opened. It happened one night during Mr. Pitt's premiership that the gallery was more than usually thronged in expectation of an important speech from the minister. The reporters, unable either by force or entreaty to obtain even tolerable accommodation, took counsel together. They left the house; and next morning, "instead of the rounded periods of the minister, there appeared nothing but one dire blank, accompanied by a strong comment on the grievance in which it had originated." Mr. speaker Abbott, not, as it was believed, without concert with the vexed and aggrieved minister, immediately directed the appropriation of the uppermost bench of the gallery to the reporters' exclusive use, with a door in the center, by which they alone had a right to enter. Soon after, a small "reporters' room" was added. The lords followed the lower house in providing accommodation for the press. During the debates on Catholic emancipation, a small space below the bar was railed off for them; and a session or two afterward, a seat was formally set apart for the reporters. When the houses of parliament were destroyed by fire in 1834, an exclusive gallery was allotted to the reporters in both chambers of the temporary structure in which the legislature held its sittings. This arrangement has been continued in the splendid new palace of Westminster, in which the two houses now hold their deliberations. In the house of lords, the reporters' gallery faces the throne and the woolsack, and is one of the most prominent internal features of the edifice. Complaint having been made of the inaudibility of the speakers, their lordships appointed a select committee, examined the reporters, the architect, etc., and took all possible measures to make themselves heard in the gallery. In the house of commons, the reporters' gallery is behind the chair. Both houses provide them with rooms and other conveniences for transcribing their notes. In the lower house, one of the committee rooms has been set apart for their use; and a room occupying the site of the old star chamber has recently been given to them for a club-room.

The modern process of parliamentary reporting may be best described by a sketch of the arrangements made by the *Times* newspaper for a due and expeditious transcript of the debates. The *Times* parliamentary corps is sixteen in number, who are equally divided between the two houses. When one house rises, the entire corps is available for duty in the other, so long as it sits. It thus happens that one of a series of reporters is constantly in the gallery of the lords, and another in the commons. Like sentinels, they cannot leave their places until they are relieved by a colleague, but this relief takes place with unvarying regularity every quarter of an hour. When both houses are sitting, each reporter has thus an hour and three-quarters for the work of transcribing his short-hand notes for the printer—a sufficiently short interval, when it is remembered that a moderate speaker will fill three-quarters of a column, and a rapid speaker not unfrequently a column, in a quarter of an hour. When his turn again comes round, each reporter must be ready to resume the duty of note-taking, and afterward that of transcription for the press. By maintaining this quick succession of reporters, the process of writing for the press is never interrupted until the whole debate of the evening in both houses is in the hands of the printer. A long speech may thus be said to extend from the mouth of the speaker to Printing House square. A part will be wet with ink on the reporters' table; one section will be traveling over the Thames embankment in swift relays of cabs; a portion, becoming larger every few minutes, will be in the hands of the compositors, and a proof-sheet ready printed, of the earlier passages, will be on the desk of the editor. On some few occasions, when a minister has been more than usually anxious to secure the accurate publication of important statements, a proof impression of a verbatim report of nearly the whole of his speech has been placed in his hands, to his extreme astonishment, as soon as he resumed his seat. The mechanical arrangements of the printing-office are equally designed to secure expedition and accuracy. The parliamentary system of the other morning newspapers resembles that of the *Times*, but as the numerical strength of their corps does not approach that of the leading journal in any case, the periods of note-taking and "relief" proportionately vary.

The system of parliamentary reporting underwent a change of great importance about 1847, when the electric telegraph was brought into general use by companies formed to work it. They proposed to supply papers out of London with London news, and a report of parliamentary debates was part of the news thus supplied. In order to get this report, the telegraph company obtained admission to the gallery for its reporters, and thus broke the monopoly which the London daily newspapers had up to that time enjoyed. Subsequently, when the electric telegraphs passed into the hands of the government, the parliamentary reports for newspapers out of London were provided by press agencies, and the accommodation in the reporters gallery had to be increased for them. With the growth of provincial newspapers, the demand for more reports than the agencies supplied was felt, and the more powerful newspapers endeavored to secure special reports for themselves by the assistance of reporters' who were engaged on the London press. In this way they were able to get and publish reports often much longer than those printed in London. This, however, was only done at great inconvenience, and an effort was made to obtain for leading provincial newspapers a right of admission to the reporters' gallery. These claims were considered by a special committee of the house of commons, which in 1879 reported in favor of them; but consideration of the report was deferred to another session.

A few years ago, the object desired by newspaper proprietors was not a literal report, but what may be called the spirit of a speech—a faithful abridgment, in fact, of the sentiment, matter, and style of the speaker. Parliamentary reports subsequently became more diffuse, the debates of a single evening not unfrequently occupying between 20 and 30 columns of small type. This, however, has not been maintained, and though much might be said against the reporting at great length of important speeches, there can be nothing said in favor of such condensation of all speeches as prevails in most of the London newspapers—the *Times* and the *Standard* being exceptions. This excessive condensation greatly strengthened the claim of the provincial newspapers for admission to the reporters' gallery, for they were not only willing but desirous of furnishing to the public fuller and better reports of debates than the London papers supplied.

It only remains to say a few words respecting *Hansard's Parliamentary Debates*, the only publication since the *Mirror of Parliament* which professes to give all the speeches fully and accurately. We have already pointed out (see HANSARD) that no staff of reporters is engaged for this work, and that when members quote *Hansard*, for the purpose of convicting an opponent of inconsistency, they are fully aware they are citing from the report of some daily journal; but they take it for granted the passage has been specially brought under the notice of the speaker by the editor of that publication, and it is therefore presumed that the report is authentic. In 1878 an arrangement was made between Mr. Hansard and the government, by which he undertook to supplement his reports by others taken by reporters in his employment who should have access to the gallery. This was not thought to be sufficient by some legislators, who desired an official report of the debates, that is to say, a verbatim report of all speeches. This was one of the questions submitted to the special committee to which reference has been made, and it indicated an opinion in favor of an arrangement by which Mr. Hansard's reports should be improved without being verbatim.

The constitutional importance of good and free parliamentary reporting can scarcely be overrated. It enables the entire people to be present, and in a manner to assist in the deliberations of parliament. The English orator addresses, indeed, not only the assembly of which he is a member, but, through it, the civilized world. Publicity has become one of the most important instruments of parliamentary government. Long before a measure can be adopted by the legislature, it has been approved or condemned by the public voice; and, living and acting in public, parliament under a free representation has become as sensitive to public opinion as a barometer to atmospheric pressure. See May's *Constitutional History of England;* Knight Hunt's *Fourth Estate;* Andrews's *History of British Journalism;* papers in *Chambers's Journal* in 1834; Grant's *The Newspaper Press* (1871); also article NEWSPAPER.

In continental countries enjoying constitutional government, official short hand writers are usually appointed by the government to report the debates, and these reports may, under certain restrictions, be transferred to the columns of the press. In the United States, particular speeches delivered in congress are fully reported and generally read; but complaints are made by members that the New York and other journals do do not give sufficient space to a report of the proceedings of congress.

REPORTS, in law are printed collections of decisions rendered by courts of high jurisdiction accompanied by the main points in the arguments of the opposing counsel, the reasons which have governed the judges in coming to the decisions set forth, and where, as in many cases, there is a dissenting or minority opinion, this may also be given. The English common law differs from other systems in that it is impossible to arrange its principles in codified form. Precedents are necessarily of great value, not as positively and irrevocably establishing the law, but as expounding the application of its principles to the points in decision. Decisions recorded in the reports may be, and often are, overruled; but they are generally considered binding on inferior courts, and are never overthrown without strong reason. It must not be supposed that all reports are of the same value or authority. They differ not only as to the grade or character of the court whose decisions they record, but also as to the ability and discrimination of the writer and his position as being or not being an official representative of the court. The early English reports, in particular, vary greatly as to their value and authority; many of the decisions previous to the revolution, and thus forming part of our own common law, are so reported as to render them absolutely worthless. It would be impossible to attempt here any comparison of the different reports, which number hundreds. The matter is ably discussed in a work by John W. Wallace, for many years reporter of the U. S. supreme court, entitled *The Reporters, Chronologically Arranged, with Occasional Remarks on their Respective Merits.* In Bouvier's *Law Dictionary* will be found a list of nearly 1000 reports, with many valuable historical and critical notes prepared by Theodore W. Dwight, LL.D. In the United States the highest reports are those of the supreme court, yet they are not binding upon state courts except in matters of constitutional law. All the states have reports of the proceedings of the supreme court, or court of last resort. These have no binding authority in other states, but are regarded with respect varying somewhat with the reputation of the judges of the court whose decisions are reported and the skill of the reporter. It has for many years been the practice of judges to write their opinions and give them to the reporters in that form. To the report of each case is prefixed a short summary of the facts and of the opinions held in the matter by the court. Reporters are now usually appointed by the court itself. So great is the number of reports that the use of digests is a necessity. There are several collections of leading cases, both American and English, such as Smith's *Leading Cases;* Wallace's *The Leading American Cases;* and White and Tudor's *Leading Cases in Equity.*

REPOUSSÉ, a French term applied to a peculiar method of ornamentation in metalwork, resembling embossing; but the effect is produced by hammering up the metal, which is generally thin, from the back, and when a rude resemblance of the figure to be produced is thus formed it is worked up by pressing and chasing the front surface. The finest specimens of this art are of the *cinque-cento* or 16th c. period, by Benvenuto Cellini. Cellini carried the art to France, where it has of late been much developed. Much common repoussé work is done in Birmingham, in the soft white metals, such as pewter and Britannia metal; and as these are easily worked, and can afterward be electroplated, so as to hide the quality of the material, they are in considerable demand. After they are hammered up from the inside, they are filled with liquid pitch, and set by until it becomes solid. Then they are modeled and chased on the surface, the pitch forming a support, which prevents the tools from pressing down more than is required. The pitch is afterward melted and drained out, and a subsequent boiling in an alkaline lye completely cleans the work. Tea and coffee pots are the chief articles made in this manner.

REPRESENTATION, in politics, the function of the delegate of a constituency in a legislative or other public assembly. The principle of representation, even where not directly recognized, must be presumed to have existed to some extent in all governments not purely democratic, in so far as the sense of the whole nation was considered to be spoken by a part, and the decisions of a part to be binding on the whole. The constitution of ecclesiastical councils, in which an express or implied representation is necessarily involved, doubtless conduced to the application of a similar principle to national assemblies; but it is in the exigences of feudalism that we trace the beginnings of an avowed and regulated system of political representation. The feudal superior who had to levy aid from his vassals, summoned a limited number of them to attend him, and confer regarding the required aid. The earliest complete system of representative institutions is to be found in the parliament of the Sicilies under the Swabian kings; but Britain is the only country in which a representative feudal assembly ripened into a legislative. As early as the reign of Henry III. we find the knights of the shire elected by the "men of the country," probably the king's military tenants, to consider, in the stead of each and all of them, what aid would be granted to the king for a proposed expedition into Gascony. Representatives of the burgesses were soon afterward summoned, and were permanently ingrafted on parliament by Edward I. In Scotland representative burgesses formed a part of the national assembly from the time of Robert Bruce's famous parliament at Cambuskenneth in 1326; but down to a comparatively late period the whole barons or freeholders of the country formed part of the king's council, and were entitled to attend in person. A system of representation among them was attempted to be introduced by James I. on his return from England, but became practically inoperative; and it was not till 1587 that the representatives of the small barons came to form part of the parliament. The progress of society has led to great changes in the constitution of the elective body, the most sweeping being those introduced by the reform acts. See PARLIAMENT, and REFORM, PARLIAMENTARY.

An important question naturally arises connected with the subject of representation: Is the delegate the mere mouthpiece of his constituents, who must give effect to all their opinions and interests, or is it his duty to exercise his trust in the first instance for the general welfare of the nation? The former idea of representation was doubtless the earlier one; but it cannot be easily vindicated on any proper theory of government; and it is now the generally recognized doctrine among English statesmen, that a member of the house of commons is bound to the entire nation by ties higher than those which bind him to his constituents, and that he ought to support such measures as he judges most beneficial to the country, even at the risk of prejudicing the immediate local interests of the body which sends him. It is therefore not very easy to reconcile with sound principles the usage which obtains so largely of demanding pledges from candidates for representation as to how they are to vote on every public question that is likely to come before them. Yet there is practically a difficulty in preventing a system of representation from becoming one of mere delegation, so long as the constitution gives to the electors the power of making their vote depend on any conditions which they may think fit to attach to it.

Most speculative politicians of the present day consider a representative government of some description as the best ideal type of government; but all repudiate the idea of an inborn right in all citizens to participate, and still more to participate equally in the right of choosing the governing body. Any very extensive suffrage must of necessity lead to the predominance of mere numbers over intelligence, while a very limited suffrage has been objected to as doing away with the benefits which the community at large are presumed to draw from a participation in public functions. Several intelligent political writers, while advocating a widely extended suffrage, have proposed a graduation of that suffrage by giving to each individual a number of votes corresponding, as far as practicable, to his intelligence, property, or social position. This is doubtless the perfect ideal of representative government, and the chief question is: By what test can the best approximate estimate of social value be arrived at? Two different schemes for this purpose have been proposed by Mr. J. S. Mill and prof. Lorimer respectively—the former founded mainly on intelligence as indicated by instruction, and the latter on wealth and social position. The attention of political writers has also lately been directed to the question of the representation of minorities, who at present are not even allowed a hearing in representative assemblies. The most feasible scheme for this purpose is perhaps that of Mr. Hare, which had the approval of Mr. J. S. Mill, by which those who do not like the local candidates, are to be allowed to fill up voting papers by a selection from the names of any persons on the list of candidates, with whose general political principles they sympathize. This system, along with its other advantages, would, it is supposed, bring into parliament numerous men of able and independent thought, who, by the present system, refrain from offering themselves, as having no chance of being chosen by the majority of any existing constituency. See J. S. Mill's *Considerations on Representative Government* (London, 1861); prof. Lorimer's *Political Progress not necessarily Democratic* (1857); and Hare's *Treatise on the Election of Representatives* (1860).

REPRESENTATION in politics (*ante*). It is one of the faults of representative government that, from the usual division of the people into two political bodies divided by strict party lines, the governing power rests in the hands, not of the whole mass of voters, but of a partisan majority. That questions purely political should be settled in this manner is perhaps free from objection; but there are many subjects of legislation in which great injustice must follow the abandoning of the rights and interests of the minority to the arbitrary decision of the majority. Thus, members of both parties are equally affected by the burdens of taxation, and both should have power in determining the amount of taxes to be laid and the application of the funds. To remedy the evils of majority tyranny, various systems of minority or proportional representation have been proposed. Two of these have been tried in this country. The "cumulative" or "free" vote is applicable in case where several officers of the same grade are to be elected. The voter is allowed to cast as many ballots as there are offices to be filled, and may concentrate or distribute them as he chooses on one or more candidates. The principle, with certain modifications, was first applied in this country to the local elections in Bloomfield, Penn., by a statute passed by the legislature of that state in 1870, and has subsequently been adopted for many other towns. The constitution of Illinois of the same year applies the method to the election of state representatives, and also to the choice of directors or managers of incorporated companies by the stockholders. In the latter particular it has been followed by the constitutions of West Virginia (1872), Pennsylvania (1873), Missouri (1875), and Nebraska (1875). The second method is known as the "limited vote," where the voter is not allowed to vote for the entire number of persons to be chosen, but must cast his votes singly for a limited number. This has been applied to the election of members at large to the constitutional conventions of New York (1867) and of Pennsylvania (1872). By the constitution of Pennsylvania of 1873, judges of the supreme court (when two or more are to be chosen for the same term), county commissioners and auditors, inspectors of election, and Philadelphia magistrates, are elected by the limited vote. By an amendment to the New York constitution it was provided that at the first election for judges of the court of appeals, each voter might vote for the chief-justice and four only of the six associates. The result was that two were elected by the minority party.

REPRIEVE (Fr. *reprendre*, to take back) is the suspension of punishment for a crime, and is used chiefly in connection with capital crimes. The power of suspending all sentences at any time is vested in the crown at discretion. There are also several grounds on which the judge or a court reprieves the sentence. One is, where the judge is not satisfied with the verdict, or is doubtful of the validity of the indictment, in which case he reprieves the sentence, in order to give time for some application to the crown. Moreover, an ordinary ground of reprieve is acted on generally as a matter of course, whenever the prisoner is a pregnant woman, and pleads that fact, in which case it is considered only merciful toward the offspring to put off the execution of the sentence until after her delivery. This was the law of ancient Rome; and nothing connected with the memory of queen Mary is more detestable than the bloody proceeding in her reign of burning a pregnant woman in Guernsey, when the child, which was born at the stake, was cast into the fire as a young heretic. When a woman pleads her pregnancy as a reason for reprieve, the practice is for the judge to empanel a jury of 12 matrons, or discreet women, to inquire into the fact, and if they bring in a verdict of "quick with child," execution is stayed, as a matter of course, from session to session, until the delivery. Another cause of reprieve is the insanity of the prisoner, for if before execution it appear the prisoner is insane, whether the insanity supervened after the crime or not, the judge ought to reprieve him.

REPRISAL is the retaking, from an enemy, goods which he has seized, or the capture from him of other goods, as an equivalent for the damage he has wrought.—A *reprise* is a ship recaptured from an enemy or pirate. If recaptured within 24 hours of the hostile seizure, she must be wholly restored to her owners; if later, she becomes the lawful prize of her recaptors.

REPRISALS, LETTERS OF, the same as LETTERS OF MARQUE (q.v.).

REPRODUCTION, or the propagation of organized beings in the animal kingdom is accomplished by three different processes. The first of the three processes by which the multiplication of individuals takes place consists in the division of one organism into two, each of these, again, dividing into two others, and so on. This is termed *reproduction by fission*. The second mode of increase consists in the formation of a bud at some part of the body of the animal. This bud gradually approximates in form to that of the parent from which it springs; its pedicle or stem gradually disappears; and the liberated bud ultimately assumes a perfect form, resembling in all respects the parent from which it sprang (*gemmation*). The third mode is far the most complicated. In it the new organism results from a series of changes occurring in an impregnated egg or *ovum*. For this process, distinct sexual organs, both male and female (which, however, may be associated in the same individual, although in all the higher animals they occur in distinct individuals), are required; a female organ for the production of cells termed "germs," and a male organ for the production of certain cells termed "spermatozoa." It is from the union (either within or without the body) and the mutual action of these cells—the germ and the spermatozoon—that the impregnated ovum results. The new resulting body is altogether different from either of the cells which took part in its production. This is the ordinary form of reproduction in all the higher animals, and may be termed *true generation*, in contradistinction to the previous form of *reproduction by multiplication*. The terms *digenesis* and *heterogenesis* have been applied by recent physiological writers to designate the form of reproduction in which the contact of germs and spermatozoa gives rise to fecundation; while the terms *monogenesis* and *homogenesis* have been similarly applied to the cases in which non-sexual reproduction takes place by fission or gemmation.

Fissiparous multiplication is best illustrated by a reference to the infusoria. It may be either longitudinal, as commonly occurs in *vorticella;* or transverse, as occurs in *stentor;* or indifferently longitudinal or transverse, as in *chilodon paramecium*, etc. The joints of tape-worms multiply in this manner, and when sufficiently developed become free. Among some of the annelids, or true worms, reproduction of this kind in a somewhat modified form is also observed. This was first noticed in a *nais* by the Danish naturalist Müller, by whom it was regarded as a rare and accidental occurrence. The more recent researches of De Quatrefages and Milne-Edwards have, however, shown that the process is one of far more significance than Müller supposed. In the genus *syllis*, De Quatrefages noticed the following appearances: When one of these worms is about to reproduce itself by fission, a number of rings become developed at its posterior extremity, and there is a notch or groove between the first of these rings and the part in front of it. The first ring soon becomes organized into a head provided with eyes and antennæ. The two annelids, parent and offspring, continue, however, to be united by the skin and intestine in such a manner that the latter animal lives solely upon the food swallowed by the former. During this period, each possesses independent life, for a struggle may often be observed between the two, each wishing to go its own way. After a lapse of a certain time, the body of the offspring becomes distended with ova in some cases, and with spermatozoa in others, while neither of these structures is to be seen in the body of the primary animal. Complete division is at length effected, and the offspring is free. In a few days, however, their bodies burst, from the distention caused by their contents. Ova and spermatozoa are thus diffused through the water, and fecundation thus takes place. In the genus *myrianida* (*autolytus*, according to Grube's classification), Milne-Edwards has seen no less than six new individuals (instead of a single one, as in *syllis*), formed in gradual succession, one before the other, between the two terminal segments of the original body. Each of these new individuals, as it arrived at maturity, and acquired the external form (in reduced dimensions) of the parents, was found to be possessed of reproductive organs, of which the original animal was totally devoid. The youngest and smallest individual is the most remote from the tail.

In these instances, multiplication by division occurs as a *natural* process, but there are many cases in which *artificial* division gives rise to multiplication. Bonnet having found that a certain kind of small worm, when cut in two, reproduced a tail at the cut extremity of the cephalic half, and formed a head upon the caudal half, increased the number of sections, and finally succeeded in dividing one worm into twenty-six parts, almost all of which acquired a head and tail, and thus became distinct individuals. Corresponding results may be obtained by dividing a planaria or actinia into many segments.

Reproduction by gemmation is a phenomenon of very frequent occurrence in the lower departments of the animal kingdom. In the lowest of the animal subkingdoms, the PROTOZOA, it occurs in the *rhizopoda*—viz., in the *foraminifera;* in the *spongiæ*, being probably the most common form of reproduction in sponges; and in the *infusoria*, as, for example, in *vorticella*. In the CŒLENTERATA, it is of almost general occurrence in the classes *hydrozoa* and *actinozoa;* and in the MOLLUSCOIDS it occurs in *polyzoa* and in *tunicata*. If some hydras are kept for a few days in a glass of their native water, knot-like excrescences will be seen on their bodies. These are the buds or *gemmæ*, which rapidly enlarge, and each by degrees assumes the appearance of a young hydra, tentacles appearing about the mouth, just as in the original animal. For some time, a portion of the food (minute infusoria, entomostraca, etc.), caught and digested by the parent, passes into the body of the offspring; but when the tentacles are sufficiently developed, the young polype catches food for itself, and when it is sufficiently matured to commence an independent existence, the connecting pedicle gives way, and the young animal is free and independent.

It must be distinctly understood, that the fact of an organism reproducing itself by fission or gemmation does not by any means exclude the possibility that it may also be reproduced by fecundated ova. That this is the case, is indeed shown in the instance of the worm *myriana*, and a very large number of corroborative cases might be readily given.

In *true generation*, two special organs are required—a female organ for producing the germ-cell or ovum, and a male organ for producing the sperm-cell or spermatozoon; and each form of generative apparatus consists of two parts, of which one is a formative organ—in the female, termed an *ovarium*, or ovary, and in the male, a *testis*—in which the reproductive cells are formed, and which is essential; and an efferent duct, by which the products of secretion are carried off. The male and female organs may exist in separate individuals, or they may co-exist in the same individual, giving rise to the condition known as *hermaphroditism* (q.v.). The former condition is termed *bisexual* or *diœcious*, and the latter *unisexual* or *monœcious*. For a general description of the changes which take place in the impregnated egg, the reader is referred to the article DEVELOPMENT OF THE EMBRYO.

We shall conclude with a brief notice of the mode or modes of reproduction in the different classes of animals, beginning with the lowest.

In the subkingdom PROTOZOA, reproduction takes place by all three modes, viz., by fission, gemmation, and impregnated ova; but fission is here the predominating form; and it is only in the infusoria that there is undoubted evidence of true generation by ova and spermatozoa. It is worthy of notice, that in the infusoria, propagation is effected in no less than four different ways—viz., by the three processes already described in this article, and by a process known as "encystation." See INFUSORIA.

In the subkingdom CŒLENTERATA, it is found that both the hydrozoa and the anthozoa multiply by gemmation, by a true reproductive process, and in a few genera by fission.

In the ECHINODERMATA, fission has been observed in one class, the holothuroidea, which, moreover, have distinct sexual organs combined in the same individual. In the other classes—the echinoidea, asteroidea, and crinoidea—the sexes are separate, and generation only takes place by the union of germs or ova and spermatozoa.

In the ANNELIDA, true generation takes place, although, as has been already shown, multiplication sometimes takes place by fission. In the lower *mollusca* or *molluscoids*, multiplication takes place by gemmation and by true generation; whilst in the higher *mollusca*, multiplication only takes place by true generation.

In the ARTICULATA—insects, crustaceans, etc.—distinct generative organs are always present, and, excepting in one class of crustaceans—the cirrhopoda—the sexes are distinct.

In the VERTEBRATA, we meet with the highest and most complex development of the generative function. In them, with a doubtful exception in the case of one or two genera of fishes, the sexes are always distinct.

The *osseous* and *cartilaginous* fishes present important differences in their reproductive organs and in their modes of reproduction. In the osseous fishes, the essential female organ—the ovary, or roe—consists of a large membranous bag, usually in two lobes, but sometimes single. When distended with ova, this organ fills the greater part of the abdominal cavity, and its lining membrane is arranged in folds, wherein the ova are formed and retained until sufficiently ripe for expulsion. They then escape into the ovarian cavity, and are expelled in almost incredible numbers through a special opening immediately behind the anus and in front of the urinary canal. As a general rule, the ova of fishes are impregnated after their expulsion; and in order that the impregnation of a sufficient number of eggs may be secured, the male secretion of fishes—the fluid containing the spermatozoa—is very abundant; the male secreting gland, which in fishes is termed "the milt" or "soft roe," being equal in bulk to the ovary of the female. In a few instances, however, the young are hatched in the ovary, and grow to a considerable size before they are born, and in these cases—as, for example, in the viviparous blenny—impregnation must take place internally. In the cartilaginous fishes—as the sharks and rays—the generative organs are of a higher type. The eggs are always impregnated within the body of the female, the male having special organs by which true sexual congress is effected, and the ovaries form two large racemous bunches, placed on either side of the spine. The eggs are large in size, and comparatively small in number; and as each egg escapes from the ovary, it is seized by a true oviduct, which furnishes it with additional protective coverings. About the middle of this tube "there is a thick glandular mass, destined to secrete a horny shell, in which the yelk and white of the egg become incased. The egg, when completed, has somewhat the shape of a pillow-case, with the four corners lengthened out into long tendril-like cords, whereby the egg is entangled among the sea-weed at the bottom of the ocean. A brittle egg-shell would soon be destroyed by the beating of the waves; hence the necessity for the corneous nature of the envelope; and yet how is the feeble embryo to escape from such a tough and leather-like cradle? This has likewise been provided for. The egg remains permanently open at one extremity; the slightest pressure from within, therefore, separates the valvular lips of the opening, and no sooner has the little shark thus extricated itself from its confinement, than the two sides close so accurately that the fissure is imperceptible."—R. Jones's *General Outline of the Animal Kingdom*, 1841, p. 534.

In the *amphibia* or *batrachia*, the sexes are more closely associated than in the osseous fishes, the ova being generally impregnated by the male as they escape from the abdominal cavity of the female. The mode of reproduction of one amphibian, the Surinam toad, is remarkable and anomalous. See PIPA.

In the true *reptiles*, the male sexual organs become more perfect, instruments being given to facilitate the impregnation of the female during that congress of the sexes which now becomes essential to fecundation.

In *birds*, the generative organs present a close analogy to those of the higher reptiles. There is only a single ovary (the left) that has a bunch-like or racenous appearance; the right, with its oviduct, being always atrophied or rudimentary—a remarkable violation of symmetry, resembling that which occurs in the lungs of serpents. As prolonged uterogestation would be incompatible with flight, incubation here attains its highest perfection.

In *mammals*, a new organ for the first time appears, from which that important class derives its name. In most of them (see MAMMALIA and PLACENTA), a temporary organ, termed the placenta, is also formed, by which the fetus is nourished during uterine existence.

For further details on the subject of this article, the reader is referred to De Quatrefages's *Rambles of a Naturalist*, and to his *Metamorphoses of Man and the Lower Animals*; Dr. Allen Thomson's article "Ovum" in the *Cyclopædia of Anatomy and Physiology;* Dr. Carpenter's *Comparative Physiology;* and to Kölliker's *Entwickelungsgeschichte des Menschen und der höheren Thiere.*

REPRODUCTION IN PLANTS. See PLANT, VEGETABLE PHYSIOLOGY, and FECUNDATION.

REPTILES (Lat. *repo*, I creep), constitute a class of the subkingdom *vertebrata*, lying between the classes of amphibians and birds. They may be briefly characterized as being cold-blooded, having a heart composed of only three cavities—viz., two auricles and a single ventricle, and as breathing by lungs throughout the whole period of their existence; in which respect they differ from the amphibians, which some zoologists associate with them, and which, in the early part of their existence, are furnished with gills for aquatic respiration. They are divided into the following orders: 1. *Ophidia*, or serpents; 2. *Sauria*, or lizards; 3. *Loricata*, or crocodiles; and 4. *Chelonia*, or tortoises; so that in so far as external form is concerned, the members of this class present a far greater diversity than is observed amongst the members of the other classes of vertebrates.

With the exception of the tortoises, the reptiles in general are of an elongated form, the body being often nearly cylindrical, and usually terminating in a very long tail. In a considerable number (as the serpents and some of the lizards) no traces of limbs are apparent; in some (as certain lizards), the limbs are rudimentary; while in the remainder the limbs are fully developed, although not to the extent to which development takes place in birds or quadrupeds, as the feet rarely suffice to keep the belly from the ground. The outer covering of the body presents several well-marked varieties. In a few of the lizards, the skin is covered with regular scales, composed of a mixture of bony and horny matter, and lying over each other like those of fishes; in most lizards and in serpents, there are scales and plates developed on the surface of the corium or true skin, and covered over with epidermis, which is thrown off at intervals, the moult forming an accurate cast of the body of the animal; while in the crocodiles and tortoises the scales are converted into true bony plates, which in the former are imbedded in the tissue of the skin, and in the latter are united with the ribs, sternum, etc., of the internal skeleton, to form the complete bony case into which the head and limbs of the animal can be retracted.

The skeleton is completely ossified in all reptiles, and presents many points of interest to the philosophical anatomist, into which we have not space to enter. In the skeleton of the crocodiles and lizards, there is an obvious distinction of the regions of the neck, trunk, and tail. The total number of vertebræ is often great, but it is chiefly in the caudal region that the excess occurs; there being 36 caudal vertebræ in the crocodile, and 115 in the monster lizard. In the serpents, the vertebral column is more abundantly subdivided than in any other animal; the number of vertebræ in the python being 422, of which about six-sevenths possess ribs articulated to their bodies by a ball-and-socket joint. By the motion which is thus allowed to the ribs, they become in some degree instruments of progression. In the reptiles generally (excepting the tortoises), one surface of each centrum (or body) of the vertebræ is concave and the other convex; while in the tortoises these surfaces are flat. The true skull is small, the bulk of the head being made up by the jawbones. As the sutures separating the individual bones never become obliterated, the reptilian skull is well adapted to illustrate the true structure of the vertebral skeleton. In Fig. 1 we have the skull of the crocodile. 1 is the *principal frontal*, divided in the serpent into two parts; 2, 2, are the *anterior* and 4, 4 the *posterior frontals*; 7 is the *parietal bone*, which is usually single in reptiles, 12, 12 are the *mastoid bones* (homologous to the mastoid process in man); 17, 17 are the *intermaxillaries*; 18, 18 are the *maxillaries*; 20, 20 are the *nasals*; 23 is the *temporal bone* (corresponding to the squamous portion of the human bone); 34, 35, 36, 37, are the *dental*, the *articular*, the *angular*, and the *opercular* portions of the *inferior maxilla*, or lower jaw; *a* is the *tympanic bone*, which supports the drum of the ear; *b* is the *zygomatic* or *malar* bone; and *c*, *c* the *lachrymals*. The lower jaw (except in the tortoises) presents the peculiarity of being composed of a number of separate pieces; there being four or five in each half-jaw in serpents, while in crocodiles and lizards each half is divided into at least five, and generally six pieces, which are united by suture. The four most important of these are shown in Fig. 1. The purpose of this arrangement is probably (as Dr. Buckland suggested in his *Bridgewater Treatise*) to diminish the risk of fracture, which would otherwise attend the snapping together of their elongated jaws.

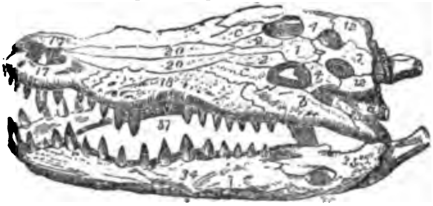


Fig. No. 1.—Skull of Crocodile.

The bones of the extremities, except in the serpents, which have no limbs, correspond with those occurring in the higher vertebrata.

The mouth, except in the chelonians, is usually provided with conical teeth, adapted rather for seizing and holding prey, than for dividing and masticating food. These teeth, like those of fishes, are successional; that is to say, new teeth are being constantly developed, whilst the older ones are regularly shed. In the crocodiles, three, or even four generations of teeth, sheathed one within the other, may often be seen in the same socket. In some instances, the teeth are attached solely to the jaws, while in others they are also attached to the pterygoid or palate bones. In chelonians, the teeth are replaced by a horny beak, which, according to the habits of the animal, is adapted for bruising as well as cutting, and which in some species constitutes a somewhat formidable weapon.

The digestive organs present less marked differences than the osseous system. With the exception of certain chelonians, all reptiles are carnivorous, and swallow their prey whole. Hence the jaws are adapted, by their mobility and subdivision into segments, to open very widely, and the œsophagus is capable of great dilatation. The tongue is commonly free, elongated, and bifid, except in the crocodiles, in which it is immovable, whence the popular idea that these animals do not possess this organ. The stomach is sometimes scarcely larger than the œsophagus and intestines (as in serpents), while in other cases it forms a sac of considerable size. In either case, it is capable of great dilatation. A liver, pancreas, and spleen are always present, the two former glands pouring their secretions into the upper part of the intestine, which is short, wide, and not much twisted, and divided into two portions, corresponding to the small and large intestines of mammals, by a valve. It finally terminates in a wide cloaca, into which the ducts of the urinary and generative organs usually open. The anal aperture of this cloaca is *transverse* in serpents and lizards, and *longitudinal* in crocodiles and tortoises. These peculiarities in the anal aperture are accompanied by remarkable differences in the external generative organs of the male, and seem to divide the class into two great sections.

It is in their circulating and respiratory organs that reptiles present the most marked characteristics. Like birds and mammals they breathe air, but like fishes, they are cold-blooded. The reason why they are unable to sustain a fixed temperature above and independent of that of the surrounding medium, is due partly to the arrangement of the blood-vessels (see CIRCULATION), and partly to the structure of the lungs. The lungs are usually of large size; but as they are not subdivided, as in mammals and birds, into innumerable microscopic air-cells, the real aerating surface is comparatively small. In several orders, they are merely capacious bags, whose vascular or aerating surface is but slightly increased by sacculi developed in their cells. In serpents, the pulmonary arrangement is singular, one lung (usually the right one) being of extraordinary length, while the other remains altogether rudimentary. It is in the tortoises and crocodiles that the lung is most highly developed. This inferiority of the respiratory apparatus of reptiles is further shown in the absence of those means for the continuous introduction and expulsion of air which are observed in birds, and still more in mammals, and which are described in the article RESPIRATION.

The cerebral portion of the *nervous* system in many respects resembles that of fishes, but the cerebral hemispheres are larger in proportion to the optic lobes, while the cerebellum is usually smaller. The organs of the senses are better developed than in fishes. The eye is always present in reptiles, and presents no remarkable peculiarity. We here first meet with a special arrangement for the protection of this delicate organ; "for while in serpents the skin of the head passes continuously in front of the eyes, merely becoming transparent where it covers the cornea, it is doubled in most other reptiles into two folds, constituting the upper and lower eyelids, which can be drawn together by a sphincter muscle; and we also find a rudiment of a third eyelid, formed by an additional fold of membrane at the inner angle, which is so completely developed in crocodiles as to form a nictitating membrane, that can be drawn completely across the eye as in birds, by a muscle specially adapted for that purpose."—Carpenter's *General and Comparative Physiology*, 3d ed. p. 495. The organ of hearing is more highly developed than in fishes or amphibia. There is no external auditory canal, the membrane of the tympanum being covered externally by the integument of the head. The senses of taste and touch are probably obtuse in most animals of this class, and from its structure, the tongue is probably rather an organ of touch than of true taste.

All reptiles are *oviparous* animals. Certain species, however, retain their ova in a sort of uterine cavity, formed by a dilatation of the oviduct near its termination in the cloaca, until the development of the embryo is so far advanced that the enveloping membrane bursts previously to the expulsion of the ovum, so that the young are actually born alive—a mode of generation to which the term *ovo-viviparous* is applied. The eggs are relatively large, and are furnished with a very large yelk, for the nutrition of the young animal. They are inclosed in a parchment-like shell, which contains very little calcareous matter. They are usually deposited in warm sandy places, well exposed to the sun, or in dunghills, in which the heat induced by the putrefactive process facilitates the final stage of embryonic development. Lizards lay from 8 to 12 eggs, serpents from 10 to 50, tortoises from 20 to 26, and crocodiles from 20 to 60. In this respect they differ widely from the amphibia, some of which lay as many as 1200 eggs. The common opinion that, after the expulsion of the eggs, the reptiles take no further care of their progeny, is erroneous. Crocodiles and lizards have been observed to watch the places which they have chosen as their nest; and the pythons (at all events, when in captivity) coil themselves around their eggs, and keep up a temperature very considerably above that of the surrounding medium. The sexes are always separate; and the male generative organs, which are far more highly developed than in amphibians, present peculiarities which, in association with the position of the anal aperture, have been adopted by zoologists as a basis of classification.

In relation to their *habitat*, it may be observed that most of the tortoises and certain serpents are essentially aquatic animals (some inhabiting fresh, and some salt water), which rarely seek the land except for the purpose of laying their eggs. Serpents, however, as a general rule, affect moist places in the neighborhood of water, although some are inhabitants of dry sandy deserts. Lizards for the most part frequent the sandy districts of hot and tropical regions, and either burrow in the ground or live in holes in trees, walls, etc. Reptiles generally predominate in the warmer regions of the globe, in which alone the largest kinds are to be found. In the northern countries, comparatively few species are found, and these pass a great portion of the year in a state of hibernation (q.v.) or torpidity. Dr. Carpenter puts down 2,000 as about the probable number of existing species of reptiles. Schinz states that in Europe there are 7 tortoises, 33 serpents, and 35 lizards. The most complete treatise on the natural history of reptiles is that of M.M. Dumeril and Bidron, in 9 volumes; it is entitled *Erpétologie Générale, ou Hist. Nat. Complète des Reptiles* (Paris, 1834–54).

REPUBLIC (Lat. *res publica*, the public good), a political community in which the sovereign power is lodged, not in a hereditary chief, but either in certain privileged members of the community, or in the whole community. According to the constitution of the governing body, a republic may therefore vary from the most exclusive oligarchy to a pure democracy. The several republics of Greece, and that of Rome were, at the outset at least, aristocratic communities. The mediæval republics of Venice, Genoa, and the other Italian towns were also more or less aristocratic. The sovereign power was held to be vested in the franchised citizens, and every function—legislative, executive, or judicial—not exercised directly by that body, could only be exercised by parties deriving their authority from it. But the extent of the franchise, and the mode of exercising it, varied much in these civic communities; and the most prosperous and long-lived was Venice, which was also the most aristocratic of them all. In the 16th c., the seven provinces of the Netherlands, on their revolt from Spain, adopted a republican form of government, as did Switzerland on becoming independent of the German empire. Great Britain was nominally a republic for eleven years (from 1649 to 1660). France was a republic from 1793 to 1805, and from 1848 to 1853; and the republic was again proclaimed Sept. 4, 1870. Such government as Spain had between Feb., 1873, and Dec. 31, 1874, was of a republican form. Switzerland is also a republic; since 1848 more democratic than formerly. The other republics of Europe are the diminutive states of San Marino and Andorra; and, in certain respects, the free cities of Hamburg, Bremen, and Lübeck. The most important of modern republics is that of the United States of America—dating from its separation from Great Britain—where pure democracy has been tried on a scale unknown elsewhere. Except during the short-lived empire from 1863-67, Mexico has been a republic since 1824. Nine republics at present exist in South America—Peru, Chili, Paraguay, Bolivia, Colombia or New Granada, Venezuela, Ecuador, Uraguay, and the Argentine Confederation. In the republics of the ancient world, the franchised classes exercised their power directly without any system of delegation or representation. The same was at first the case in the Swiss cantons, where, however, representative government has been gradually introduced. Modern republics have been founded on the representative, not the direct, system, which can hardly exist except in a community that is very small and concentrated as to space. Switzerland and the United States of America are *federal* republics, consisting of a number of separate states bound together by a treaty, so as to present to the external world the appearance of one state with a central government, which has the power of enacting laws and issuing orders which are directly binding on the individual citizens.

REPUBLIC, a co. in n. Kansas, adjoining Nebraska; drained by the Republican river; about 725 sq.m.; pop. '80, 14,913—12,657 of American birth. The surface is rolling, with an extensive growth of timber. The soil is fertile. The principal productions are corn, wheat, and live stock. Co. seat, Belleville.

REPUB'LICAN, a party name in American politics, which has had at different times different significations. At the adoption of the federal constitution in 1787, and while its ratification by the several states was under discussion, the country was divided into two parties—the federalists, headed by Washington and the elder Adams; and the anti-federalists (who afterward took the name of republicans), under the lead of Jefferson and Madison. The federalists were in favor of a strong centralized government; the republicans advocated the sovereignty of the states and the rights of the people; and finally secured those amendments and additions to the constitution which were intended to guarantee state rights, and which declared that all powers not expressly granted to congress by the constitution are retained by the states or the people. During the French revolution and the wars which succeeded it, the federal party sympathized with England, while the republicans favored the French, and being in power, under the presidency of Mr. Madison, declared war against England in 1812, a measure which the federalists violently opposed, going so far in the Hartford convention as to threaten a dissolution of the union. During the political excitements of this period, when the excesses of the French revolution had thrown a certain degree of odium upon its supporters, the republicans were stigmatized by their opponents as democrats. The name, given as a reproach, was soon adopted; and the party of Jefferson and Jackson called itself democratic republican, and its members were usually called democrats; while the name of federalist having become unpopular by the opposition of the party to the war with England, it adopted the designation of national republicans, and some years later, of whigs, which was the name taken by the "disloyal" party in the war of independence, the "loyal" party being called tories. The whigs of 1840 repudiated alike the principles and name of the federalists; they professed to be followers of Jefferson, and called themselves democratic whigs.

In the effort to elect Mr. Fremont in 1856, and in the election of Mr. Lincoln in 1860, the whig party, deserted by many of its more conservative members, known as old whigs, but re-enforced by a larger number of free-soil democrats and abolitionists, adopted the name of republicans, and were called by their opponents black republicans, from their anti-slavery tendencies. In the presidential contest of 1864, the republicans, hoping to secure the support of the war or union democrats, adopted the name of the "union party," while they went further than the ancient federalists in support of a strong centralized government. The federalist, national republican, whig, and republican party has been essentially the same, and for the most part a New England or northern party—its principal leaders having been John Adams, Josiah Quincy, Alex. Hamilton, Daniel Webster, Henry Clay, Wm. H. Seward, Abraham Lincoln, and Ulysses Grant. The democratic party has its centers in Virginia and New York, and was the party of Jefferson, Madison, Jackson, Calhoun, Van Buren, Polk, Pierce, Buchanan. The former party advocated a construction of the constitution favorable to the powers of the federal government, a national bank, and a high protective tariff; the democratic party, on the other hand, held to a strict construction of the constitution, a careful limitation of the powers of the central government, an independent treasury, a specie currency, and free-trade, or a tariff for revenue only. There was, 30 years ago, a respectable whig minority in most of the southern states, and in two or three, whig majorities; but when the whig party adopted abolition, and took the name republican, every southern state voted with the democratic party. Since the civil war, the people of the southern states have been still more closely attached to the democrats.—Other party names met with in American political writings are of a local, factional, or temporary character. "Blue-light federalist" was a name given to those who were believed to have made friendly signals to British ships in the war of 1812. "Barn-burner" was applied as a term of reproach to a section of the democracy supposed to be in sympathy with the "anti-renters." The "soft shells" were "free-soil" democrats, in favor of excluding slavery from the territories and future states of the union; while the "hard shells" were in favor of what they held to be the rights of the south. The more widely-known name of "locofoco," applied to, and good-naturedly accepted by the democratic party, arose from the fact, that a meeting of a section of the party in Tammany hall, its New York headquarters, having been deprived of light by the turning off of the gas, at the order of the party managers, lighted up the hall with candles, by the aid of lucifer or loco-foco matches, and so passed its resolutions. "Copperhead," the name of a venomous serpent, was applied to the peace party by the advocates of the war for the union.

REPULSION, like caloric, luminous corpuscles, and other crude hypotheses of mediæval times appears to be doomed to speedy extinction. The apparent repulsion between the particles of a gas, in virtue of which it exerts pressure on the containing vessel, is now known to be due to motion (see HEAT). A wet cork and an oiled one, floating on water, repel each other—a phenomenon fully accounted for by capillary *attraction;* as is that of the apparent repulsion of mercury by glass, which is shown to be due to the fact, that mercury attracts itself more than it attracts glass. No one now believes that a balloon rises while a stone falls because the former is repelled, and the latter attracted, by the earth. The last is a very good example, because it clearly shows how apparent repulsion may be the result of attraction. The earth attracts the balloon *less* than it attracts an equal bulk of the medium (air) in which it floats; and, consequently, the pressure of the air on the balloon is more than sufficient to support its weight. The moon raises tides not only on the side of the earth nearest her, but also on that furthest from her. No one imagines that she attracts the nearer water, and repels the further. We know that she attracts the nearer water more, and the further less, than she attracts the earth; and that the apparent repulsion is thus merely a difference of attractions.

It is not quite so clear how we are to account generally for repulsion in electricity (q.v.), magnetism (q.v.), and electro-magnetism (q.v.), though many of these phenomena are known (especially by the beautiful experimental researches of Faraday) to bear explanations precisely analogous to that of the balloon above alluded to. There are also very curious problems, apparently involving repulsion, connected with the behavior of the tails of comets. But it is reasonable to suppose that, in all probability, we shall soon be able to account for all these phenomena by simple differences of attraction on the body influenced and the medium which surrounds it. Our real difficulty will thus be reduced to the explanation of attraction itself, which promises to be a problem of a far higher order of complexity. For an account of some of the modern speculations on this subject, see FORCE.

REPUTE, in Scotch law, is used sometimes as a technical term, which it is not in English law. Thus, a habit and repute thief is one who, as a matter of fact, is notoriously a thief. So habit and repute marriage is a marriage constituted between parties who have notoriously lived as man and wife, and are supposed by neighbors and friends to be married, though there never was a regular marriage.

REPU'TED OWNERSHIP is a phrase used in the English bankruptcy law to denote that the bankrupt at the time of his bankruptcy was apparently the owner of goods in his possession. The general rule is, that whatever belonged to the bankrupt at that date goes to his assignees in bankruptcy, for the purposes of sale, and distribution of the proceeds among his creditors. But as a trader often has the goods of others in his possession with their consent, and thus has the appearance of a greater capital or stock than he possesses, and thereby obtains greater credit than he would otherwise do, it is provided by the bankrupt act that if the bankrupt at the date of his bankruptcy shall, with the consent of the true owner, have in his possession, order, or disposition any goods or chattels whereof he was the reputed owner, or whereof he had taken upon him the sale, alteration, or disposition as owner, the bankruptcy court shall have power to order the same to be sold and disposed of for the benefit of the creditors under the bankruptcy.

The object of this is to prevent deceit by a trader from the apparent possession of property to which he is not entitled; as it makes the real owners of goods who intrust them to a trader, careful, that they run the risk of the goods being seized for the general benefit of the creditors. Where, however, the articles in possession of the bankrupt are of that peculiar description that they are naturally calculated to excite an inquiry on the part of creditors as to whose they are, it is otherwise. Thus, pictures deposited with a bankrupt to take charge of, as they do not lead to any erroneous belief on the part of persons dealing with him, so they do not fall to be sold and divided as part of his assets. A similar doctrine exists in Scotland by the common law, and is therefore applied to other cases than bankruptcy. By the mercantile amendment act, 19 and 20 Vict. c. 60, s. 1, in order to assimilate the law to that of England, it was declared that goods sold, but not delivered, shall not be attachable by the creditors of the seller, to the effect of preventing the purchaser or others from enforcing delivery of the same, and the right of the purchaser to demand delivery of such goods from and after the date of the sale, shall be attachable by the creditors of the purchaser.

REQUE'ÑA, a t. of Spain, in the modern province of Cuença, and about 80 m. s.e. of the town of that name. It contains an industrious population, amounting to 10,500, who are employed in the manufacture of woolen, cotton, and silk fabrics.

REQUESTS, Court of, an ancient court of equity in England, inferior to the court of chancery, and presided over by the lord privy seal. It was abolished by 16 and 17 Char. I., c. 10. Also. a local tribunal (known likewise by the name of court of conscience) instituted in London by Henry VIII. for the recovery of small debts, with jurisdiction between citizens and freemen in questions of debt or damage under 40s., afterward extended to questions under £5. Similar local tribunals were instituted by act of parliament in other parts of the kingdom; but they have all been superseded by the county courts.

RE'QUIEM (Lat. *requies*, rest), a dirge or solemn service for the dead in the Roman Catholic church. It consists in the celebration of the mass *pro fidelibus defunctis* (for the faithful departed), the first words of the introit of which are *requiem æternam*.

REQUISITION, in international law, besides meaning the demand made by the authorities of one nation or state upon those of another for the rendering up (or extradition) of an alleged criminal, is used also in the rules of war as nearly synonymous with the word "contribution." The distinction made is that a requisition is a demand upon the people of an invaded country to furnish such things as provisions, forage, transportation, or even labor; while a contribution is a payment in money to provide for the needs of the military or civil government established. The former term, however, is generally used to cover all demands upon the people of the conquered country. It is now well settled that the rights of private citizens should be respected and their property secured from pillage. It is the rule of most civilized nations that supplies or labor demanded should be paid for after the war, and receipts given at the time. This is the principle laid down in the *Instructions for the Armies of the United States in the Field*. It was formerly the practice to inflict severe requisitions in the way of fines on an offending district or town as a penalty. It is now generally agreed that such measures are rarely justifiable and are of little practical benefit to those who employ them.

RERE'DOS (Fr., behind the back), the wall at the back of an altar, seat, large fireplace, etc. In churches, the reredos is usually in the form of a screen detached from the east wall, and is invariably ornamented with niches, statues, etc., or with paintings or tapestry. Very fine examples exist at Durham, St. Albans, etc.

RESACA DE LA PALMA, Battle of, May 9, 1846, between 6,000 Mexican troops under gen. Arista, and 2,000 Americans under gen. Taylor, ending after a short engagement in the defeat of the Mexicans. The ravine in which it occurred, covered by a thick growth of palm trees, is in Cameron co., Texas, 4 m. n. of Brownsville, and 3 m. n. of Matamoras, on the road from Point Isabel to Brownsville.

RE'SCRIPTS (Lat. *rescripta*), answers of the popes and emperors to questions in jurisprudence officially propounded to them. *Rescripta principis* were one of the authoritative sources of the civil law, and consisted of the answers of the emperor to those who consulted him, either as public functionaries or as individuals, on questions of law. They were often applied for by private persons, more especially women and soldiers, to solve their doubts or grant them privileges. The rescripts directed to corporate and municipal bodies were known as *pragmaticæ sanctiones*, a name which has found its way into the public law of Europe. See Pragmatic Sanction. Rescripts might gradually come to have the force of law, in so far as their determinations in particular cases were of general application.

RESCUE, in English law, is the illegal delivery and discharge of a prisoner or of goods out of the custody of the law. If, for example, a tenant whose goods are distrained for rent, take them by force from the bailiff, the distrainer has a right of action against a tenant or person who rescues the goods. When a prisoner is in custody for felony, and is rescued, the rescuer commits a felony. So the rescue of a prisoner for debt is an indictable offense, punishable by imprisonment for life, and forfeiture of lands and goods.

RESECTION or EXCISION OF JOINTS is an operation in which the diseased bone of a joint is cut out, in place of cutting off the whole limb. Dr. Druitt, in his able summary on this subject in *The Surgeon's Vade-Mecum*, remarks, that "it seems to be established that excision is on the whole safer than amputation; less violence is done to the body, fewer great arteries and nerves are injured, and, what is of more consequence, fewer large veins are divided, and as the articular end of the bone only is sawn off, and the medullary canal not touched, there is less chance of pyæmia. Lastly, the patient is left with an imperfect limb, it is true, but with one which, in most cases, is highly useful." The operation has been performed on the ankle-joint, the elbow, hip-joint, knee, and shoulder. Few subjects have in recent times excited more discussion among surgeons than the application of this operation to the knee-joint. The operation was first performed in 1762; and up to the year 1830, there are records of 19 cases out of which 11 died. Form 1830 to 1850, the operation was never performed, and was generally condemned; but in the last-named year, it was revived by prof. Fergusson, and is now a frequent and regularly recognized operation. "The cases," says Dr. Druitt, "in which it ought to be performed, are, generally speaking, such cases of injury or disease as would otherwise be submitted to amputation. The *object* of the operation is to produce a firm and useful limb, slightly shortened, and with entire bony union or fibrous union, admitting of some small degree of motion at the situation of the joint. But all cases are not suitable for excision; and those cases are unsuitable and better adapted for amputation in which either the *quantity* of the diseased bone is very great (for then the case will probably not do well, or, if it proceed to recovery, and the patient be young, the future growth of the limb will be prevented), or the *quality* of the disease may be such as experience has shown to be incompatible with the exudation of healthy material of repair." In at least 50 per cent, the operation results in a good useful leg. It has already saved so many limbs that it must be regarded as one of the greatest triumphs of modern surgery.—Further information on this subject may be found in prof. Fergusson's *Lectures on Conservative Surgery*, delivered in 1864, at the royal college of surgeons, and reports in *The Lancet*.

RESEDA'CEÆ, a natural order of exogenous plants, mostly herbaceous; having alternate leaves; terminal spikes of hermaphrodite irregular flowers; the calyx of 4 to 7 unequal segments; the corolla of 4 to 7 petals, alternate with the segments of the calyx, the lower petals entire, the upper much cut; the stamens 10 to 30, inserted on a fleshy receptacle; the germen free, one-celled; the fruit a many-seeded capsule, three-horned, and often open at the apex, so as to expose the seeds, which are kidney-shaped. There are about forty known species, mostly natives of Europe and the w. of Asia, and mostly mere weeds. Weld (q.v.) and mignonette (q.v.) are the species most worthy of notice.

RESERVATION is a term used in lease and also in grants of a less estate than the fee-simple. Thus, if A, the owner in fee-simple of real estate, grant a lease to B, a third party, he does not give away his whole interest, but merely part of it, and that part not given away is said to be reserved or excepted. The word reservation is, however, chiefly used in reference to rent, it being said that a landlord, on letting his land, reserves to himself a rent out of the premises, and he has certain well-known remedies for the recovery of such rent (q.v.).

RESERVATION, MENTAL (Lat. *reservatio* or *restrictio mentalis*), the act of reserving or holding back some word or clause which is necessary to convey fully the meaning really intended by the speaker. It differs from equivocation (Lat. *equivocatio* or *amphibolia*) in this, that in the latter the words employed, although doubtful, and perhaps not fitted naturally to convey the real meaning of the speaker, are yet, absolutely speaking, and without the addition of any further word or clause, susceptible of that meaning. Thus, an example of equivocation would be: "I did not write this libel," meaning "I did not perform the mechanical operation of *writing it with a pen*," although I had really *composed* and issued it. A mental reservation might be involved in the same words, if one were to say: "I did not write this libel," mentally withholding the word "to-day," although he had written it "yesterday," or on some earlier day. Few questions in casuistry have excited more controversy, or have been the subject of fiercer recrimination, than that of the lawfulness of equivocation and mental reservation. In the celebrated *Letters* of Pascal (q.v.) against the Jesuits it was one of the most prominent, and, used as he employed it, the most effective topics; and Pascal's charges against the Jesuit casuistry of that day have been repeated in almost every popular controversy on the subject which has since arisen. There are several varieties of mental reservation, differing from each other, and all differing from equivocation under its several forms. But as regards the morality of the subject, all the forms of language calculated to deceive may be classed together, and may be treated according to the same common principles. Mental reservation is of two kinds, *purely mental* and *not purely mental*. By the former designation is meant a mental reservation which cannot be detected, whether in the words themselves or in the circumstances in which they are spoken. Of this kind would be the mental reservation implied if a person, on being asked if he had seen A. B. (whom he really had just seen *walking* by), were to reply: "I have not seen him," meaning "*riding on horseback.*" A "not purely mental" reservation is that which, although not naturally implied or contained in the words, may, nevertheless, be inferred or suspected, either from them or the circumstances in which they are used. Of this kind would be the mental reservation of a servant, in giving the ordinary answer to a visitor's inquiry for his master: "Not at home," although his master were really in the house; or that of a confessor, who, in a country where the privileges of the secret of the confessional are known and admitted, on being asked whether a certain person had committed a crime, which the confessor knew from his confession that he had committed, should answer: "I do not know," meaning "outside of the confessional." And, in general, all such doubtful forms, whether of mental reservation or of equivocation, may be divided into *discoverable* and *undiscoverable.* Much, although certainly not all the odium which has been excited against the casuists for their teaching on this head, has arisen from the confusion of their views as to these two classes of mental reservation; and the witty ingenuity with which Pascal mixed up examples of both, and applied to one what was really said of the other, did far more to damage the theological reputation of his adversaries, as a school, than any of the genuine really objectionable decisions which he cited from the writings of individual divines. Mental reservation has formed a subject of discussion for Protestant as well as Catholic divines; but without entering into a detailed history of this curious branch of casuistry, we shall content ourselves with stating briefly the chief principles on which the decisions of the most approved writers, especially of the Roman Catholic school, are founded.

First, "purely mental" reservations, and "absolutely undiscoverable" equivocations are held to be in all cases unlawful, such forms of speech being, in truth, lies; inasmuch as they have but one real sense, which is not the sense intended by the person who uses them, and hence can only serve to deceive. This doctrine is held by all sound Catholic casuists, and the contradictory doctrine is expressly condemned by pope Innocent XI. (Propp. 26, 27). On the contrary, mental reservations "not purely mental," and "discoverable" equivocations, are held to be not inconsistent with truth, and, in certain circumstances, when there is necessity or weighty reason for resorting to them, allowable. For the absolute admissibility of the expedient of mental reservation and of equivocation in such circumstances, casuists allege scriptural precedent from Genesis xx. 12, Matt. xi. 14, Acts xxiii. 6, and other passages; and the principles on which their use, in such case, is defended, are (1) that there is supposed to be in the circumstances justification, and even necessity, for not making known the whole truth; and (2) that the mental reservation in the case supposed does not amount to more than a mere *withholding the entire truth,* inasmuch as what is stated is absolutely true, and the real meaning of the speaker is absolutely *contained in it, and discoverable from it;* and the false construction put upon it by the hearer, although permitted through necessity or grave reason by the speaker, is not *positively* put forward by him. A historical example of such equivocation or reservation is in the well-known answer of St. Athanasius to the question of the party who were in pursuit of him, and who, overtaking him, but not knowing his person, asked what way Athanasius had gone. "*He is not far off,*" replied Athanasius, and the party passed on in pursuit. A less easily discoverable equivocation is ascribed to St. Francis of Assisi, who, when a gang of robbers in pursuit of a traveler asked him whether he had seen the traveler pass by, put his hand up the sleeve of his habit, and replied: "He did not pass *this* way," meaning "up his sleeve." And an ordinary example of discoverable mental reservation is that of a person who, on being asked by one to whom he could not with safety give a refusal, whether he has any money, should reply: "No," meaning "none to lend you." In order, however, to justify the use of these devices of speech, casuists require that there shall be some grave and urgent reason on the speaker's part; as, for example, the necessity of keeping a state secret, or a secret of the confessional, or of a professional character, or even the confidence intrusted by a friend, or the ordinary and fitting privacy which is required for the comfort and security of domestic life, and of the peaceful intercourse of society; and that the concealed sense of the form of speech employed, although it may be *actually undiscovered,* and even unlikely to be discovered, may yet be, in all the circumstances, *really discoverable.* On these two leading theoretical principles the majority of casuists are agreed. But a wide field for practical discussion lies between them, in the variety of senses which may be attached to the phrases "not purely mental" and "discoverable;" and it is in the practical interpretation of these terms that some of the casuists have found scope for the introduction of the lax decisions which have brought odium upon casuistry. Much of this odium has fallen upon the society of the Jesuits to such a degree that their name has been popularly associated with the worst forms of the practice of mental reservation. See JESUITS and PASCAL.—See Scavini, *Theologia Moralis,* ii. 23; Murray, *Theological Essays,* iv. 274, and foll.

RESERVATIONS, INDIAN. Besides the Indian territory (q.v.), large tracts of land have been reserved for the use of certain tribes of Indians in the United States, and are held apart for this service by the government, in the department of the secretary of the interior. To these reservations the tribes are from time to time assigned, being granted certain privileges and possessions, other than the land, and thereby encouraged to education and civilization. The following table gives the census of the Indian tribes of America in the years named, excepting that the estimates made prior to 1850 did not include the Indians of Texas, or those of the territory gained from Mexico:

1.	1789.	Estimate of secretary of war	76,000
2.	1790–91.	“ “ Gilbert Imlay	60,000
3.	1820.	Report of Morse on Indian affairs	471,036
4.	1825.	“ “ secretary of war	129,366
5.	1829.	“ “ “ “	312,930
6.	1834.	“ “ “ “	312,610
7.	1836.	“ “ superintendent of Indian affairs	253,464
8.	1837.	“ “ “ “ “ “	302,498
9.	1850.	“ “ H. R. Schoolcraft	388,229
10.	1853.	“ “ U. S. census, 1853	400,764
11.	1855.	“ “ Indian office	314,622
12.	1857.	“ “ H. R. Schoolcraft	379,264
13.	1860.	“ “ Indian office	254,300
14.	1865.	“ “ “ “	294,574
15.	1870.	“ “ U. S. census	313,712
16.	1870.	“ “ Indian office	313,370
17.	1875.	“ “ “ “	305,068
18.	1876.	“ “ “ “	291,882

The following table exhibits the location and number of 185 tribes, 316,113 souls, and the names of the different reservations apportioned to them:

TRIBE.	Number of Souls.	RESERVATION.	TERRITORY.
Alseas	100	Alsea Reserve	Oregon,
Apaches, 27 divisions, 94 to 1805 each	14,071	Various reserves, agencies, and other points	Arizona, New Mexico, and Ind. Ter.
Arapahoes, North	1,092	Red Cloud Agency	Wyoming.
“ South	1,644	Cheyenne “	Ind. Ter.
Aravipais	200	Camp Grant	Arizona.
Arickarees	1,646	Fort Berthold	Dakota.
Assinaboines	4,698	Milk River Agency	Montana.
Bannocks	600	Fort Hall Reserve	Idaho.
“	1,200	Shoshone “	Wyoming,
Blackfeet	1,500	Blackfeet Agency	Montana.
Bloods	1,500	“ “	“
Caddoes	521	Wichita “	Ind. Ter.
Cakokiams	85	Chehalis Reserve	Wash. Ter.
Calapooias	24	Grande Ronde	Oregon.
Calispells	114	Fort Colville	Wash. Ter.
Cancons	149	Round Valley	California.
Cayugas	143	Cattaraugus	New York.
“	22	Tonawanda	“ “
Cayases	385	Umatilla Reserve	Oregon.
Chasta-Scotons	200	Malheur “	“
Chehalis	212	Chehalis “	Washington Ter.
Cherokee	17,217	Nation	Indian Territory.
“	300	N. Carolina, Georgia & Tenn.	
Cheyennes, North	1,202	Red Cloud Agency	Wyoming.
“ South	2,250	Cheyenne Reserve	Indian Territory.
Chickasaws	6,000	Nation	“ “
Chilions	400	Camp Apache	Arizona.
Chimehuevas	450	Colorado River	“
Chinooks	250	Chehalis Reserve	Washington Ter.
Chippewas, 23 divisions, 115 to 3,100 each	24,810	Various reserves, agencies, and other points	Minnesota, Dakota, etc.
Chocktaws	16,000	Nation	Indian Territory.
Clackamas	57	Grande Ronde	Oregon.
Clatsops	138	Chehalis Reserve	Washington Ter.
“ Coast	28	Grande Ronde	Oregon.
Coahuilas	800	Klamath Reserve	“
“	150	Colorado River	Arizona.
Cocopahs	800	Port Isabel	California.
“	108	Colorado River	Arizona.
Cœur d'Alenes	1,349	Cœur d'Alene	Idaho.
Colvilles	1,100	Fort Colville	Washington Ter.
Comanches	2,643	Kiowa Agency	Indian Territory.
“ Penetethka	345	Wichita Agency	Indian Territory.
Coosas	123	Alsea Reserve	Oregon.
Cowlitz	210	Chehalis Reserve	Washington Ter.
Cow Creeks	28	Grande Ronde	Oregon.
Creeks	13,000	Nation	Indian Territory.
Crows, Mountain	3,000	Mountain Crow	Montana.
Crows, River	1,200	River Crow Reserve	“
“ other River	1,240	Milk River Agency	“
Delawares	30	Kiowa Agency	Indian Territory.
“	81	Wichita “	“ “
D'Wamishes	400	Tulalip Reserve	Washington Ter.
Flatheads	471	Flathead “	Montana.
Foxes, Mississippi	374	Quapaw “	Indian Territory.
“ Missouri	43	Great Nemaha	Nebraska.
Gros Ventres	600	Fort Berthold	Dakota.
“ Oregon	1,100	Milk River Agency	Montana.
Hamptolope	97	Chehalis Reserve	Washington Ter.
Hobs	73	Quinaielt “	“ “

TRIBE.	Number of Souls.	RESERVATION.	TERRITORY.
Hoonsoltons	113	Hoopa Valley	California.
Hoopas	304	“ “	“
Hualpais	620	Colorado River	Arizona.
Humboldts	180	Hoopa Valley	California.
Ionis	85	Wichita Reserve	Indian Territory.
Iowas	226	Great Nemaha	Nebraska.
Kahmiltpahs	100	Yakama Reserve	Washington Ter.
Kansas or Kaws	593	Kansas “	Indian Territory.
Kaskaskias	30	Quapaw “	“ “
Keawahs	117	Tule River “	California.
Keechies	106	Wichita “	Indian Territory,
Kickapoos	621	Sac and Fox “	“ “
King's River, Lower	175	Tule River “	California.
“ “ Upper	410	“ “ “	“
Kiowas	1,700	Kiowa “	Indian Territory.
Klamaths	550	Klamath “	Oregon.
Klikitats	200	Yakama “	Washington Ter.
Klinquits	200	“ “	“
Koolenays	471	Flathead “	Montana.
Kowwassayes	600	Yakama “	Washington Ter.
Little Lakes	109	Round Valley	California.
Lipans	400	Scattered	Florida.
Luckamutes	23	Grande Ronde	Oregon.
Makahs	558	Makah Reserve	Washington Ter.
Manaches	211	Tule River Reserve.	California.
Mandans	450	Fort Berthold	Dakotah.
Maricopas	300	Maricopa Reserve	Arizona.
Mary's River	32	Grande Ronde	Oregon.
Menomonees	1,480	Green Bay Reserve	Wisconsin.
Meethows	626	Fort Colville “	Washington Ter.
Miamis	97	Quapaw “	Indian Territory.
“	345	Scattered	Indiana.
Miscolts	216	Hoopa Valley	California.
Missourias	371	Otoe Reserve	Nebraska.
Modocs	147	Quapaw “	Indian Territory.
“	100	Klamath “	Oregon.
Mohaves	1,540	Colorado River	Arizona.
Molialus	66	Grande Ronde	Oregon.
Molels	57	“	“
Moquis, Pueblos, 7 divisions, 125 to 525	1,672	Villages	Arizona.
Muckleshoots	100	Muckleshoot Reserve	Washington Ter.
Munsees	111	Munsee “	Wisconsin.
Navajoes	9,068	Navajoe “	New Mexico.
“	2,000		Arizona.
Nehalims, coast	36	Grande Ronde	Oregon.
Nespectums	100	Fort Colville Reserve	Washington Ter.
Nestucalips	200	Grande Ronde	Oregon.
Nez-Perces, 3 divisions, from 420 to 900 each	2,170	Nez-Perces Reserve	Idaho.
Nez-Tuccas, coast	58	Grande Ronde	Oregon.
Nisqually	230	Nisqually Reserve	Washington Ter.
Ochecholes	100	Yakama “	“ “
Okanagans	411	Fort Colville “	“ “
Omahas	951	Omaha “	Nebraska.
Oneidas	198	Oneida “	New York.
“ Wisconsin	1,279	“ “	Wisconsin.
Onondagas	99	Alleghany “	New York.
“	46	Cattaraugus “	“
“	58	Onondaga “	“
Oregons	58	Grande Ronde	Oregon.
Osages, 8 divisions, from 237 to 936 each	3,956	Osage Reserve	Indian Territory.
Otoes	823	Otoe “	Nebraska.
Ottawas, 4 divisions, from 142 to 3975 each	5,304	Lake Superior Quapaw Reserve	Michigan. Indian Territory.
Owen River	4,798	Tule River “	California.
Papagoes	6,000	Papagoe “	Arizona.
Palouses	400	Yakama “	Washington Ter.
Passamaquoddies	200	River St. Croix	Maine.
Pawnees, 5 divisions, from 360 to 759 each	2,817	Pawnee Reserve	Nebraska.
Pend d'Oreilles	1,026	Flathead “	Montana.
Penobscots	300	Oldtown	Maine.
Peorias	47	Quapaw Reserve	Indian Territory.
Piankeshaws	40	Quapaw “	“ “
Piegans	2,450	Piegan “	Montana.
Pimas	4,000	Pima “	Arizona.
Pisquoses	200	Yakama “	Washington Ter.
Pit Rivers	64	Round Valley	California.
Poncas	730	Ponca Reserve	Dakota.
Potter Valleys	298	Round Valley	California.
Pottawotomies, 8 divisions, 60 to 1600 each	2,060	Lake Superior Pottawotamie Reserve	Michigan. Kansas & Ind. Ter.
Pueblos	9,500	Nineteen Villages	New Mexico.
Puyallups	579	Puyallup Reserve	Washington Ter.
Quapaws	236	Quapaw “	Indian Territory.
Qui-leh-Utes	234	Quinaielt “	Washington Ter.
Qui-nai-elts	117	“ “	“ “
Quits	95	“ “	“ “

TRIBE.	Number of Souls.	RESERVATION.	TERRITORY.
Redwoods	225	Hoopa Valley	California.
"	71	Round "	"
Renegades	900	Roaming	Oregon.
Rouge Rivers	84	Grande Ronde	"
Sacs, Mississippi	376	Sac and Fox Reserve	Indian Territory.
" Missouri	45	Great Nemaha	Nebraska.
Saint Regis	688	Saint Regis Reserve	New York.
Salmon Rivers	49	Grande Ronde	Oregon.
San Poels	127	Fort Colville Reserve	Washington Ter.
Santaims	71	Grande Ronde	Oregon.
Seapeats	300	Yakama Reserve	Washington Ter.
Senecas, 4 divisions, from 207 to 1470 each	3,250	Alleghany " Quapaw "	New York. Indian Territory.
Seminoles	2,438	Seminole "	" "
"	300	Scattered	Florida.
Shastas	47	Grande Ronde	Oregon.
Shawnees, eastern	90	Quapaw Reserve	Indian Territory.
" absentees	688	Sac and Fox Reserve	" "
Shoalwater Bays	197	Shoalwater Bay	Washington Ter.
Shoshones, 12 divisions, from 172 to 2000 each	......	Various reserves and other points	Idaho, Nevada, Wyoming.
Shyicks	400	Yakama Reserve	Washington Ter.
Sias	127	Hoopa Valley	California.
Siaywas	200	Yakama Reserve	Washington Ter.
Sioux, 83 divisions, from 150 to 6,000 each	46,284	Various reserves, agencies, and other points	Montana, Dakota, Wyoming.
Sinselaus	68	Alsea Reserve	Oregon.
Skinpahs	300	Yakama Reserve	Washington Ter.
S'Klallams	575	Madison "	" "
Skokomishes	291	" "	" "
Spokanes	900	Fort Colville Reserve	" "
Squaxins	150	Squaxin Reserve	" "
Snakes, 3 divisions, 98 to 1200 each	1,565	Klamath Reserve and other points	Oregon.
Stockbridges	130	Stockbridge Reserve	Wisconsin.
Tawacanies	125	Wichita Agency	Indian Territory.
Tejons	2,200	Tule River Reserve	California.
Terrinos	56	Warm Spring Reserve	Oregon.
Tillamooks	168	Grande Ronde	"
Timpanagos	318	Muddy Valley Reserve	Nevada.
Tonkaways	200	Scattered	Florida.
Towoccaroes	127	Wichita Reserve	Indian Territory.
Tules	1,500	Tule River Reserve	California.
Tuscaroras	448	Tuscarora "	New York.
Twanas	275	Madison "	Washington Ter.
Ukies	181	Round Valley	California.
Umatillas	302	Umatilla Reserve	Oregon.
Umpquas	44	Alsea "	"
"	131	Grande Ronde	"
Utes, 66 divisions, from 17 to 4,000 each	21,965	Various reserves, agencies and other points	Colorado, Utah, and New Mexico.
Wacoes	140	Wichita Reserve	Indian Territory.
Walla-Wallas	201	Umatilla "	Oregon.
Wappato Lakes	61	Grande Ronde	"
Warm Springs	304	Warm Spring	"
Wascoes	320	" "	"
Washoes	500	Roaming	Nevada.
Weas	43	Quapaw Reserve	Indian Territory.
Wenatchepums	200	Yakama "	Washington Ter.
Wichitas	299	Wichita "	Indian Territory.
Wichumnies	113	Tule River "	California.
Winnebagoes, Nebraska	1,462	Winnebago "	Dakota.
" Wisconsin	860	Roaming	Wisconsin.
Wishams	300	Yakama Reserve	Washington Ter.
Wyandottes	239	Quapaw "	Indian Territory.
Wylackies	47	Round Valley	California.
Yakamas	400	Yakama Reserve	Washington Ter.
Yamhils	35	Grande Ronde	Oregon.
Yavapais	4,000	....	Arizona.

RESERVATUM ECCLESIASTICUM, a provision of the religious peace of Westphalia, so very celebrated in German history, that a brief explanation seems necessary. By this clause of the treaty of Westphalia (1549), it was enacted, that if the holder of any ecclesiastical dignity, or of any territorial jurisdiction or property annexed to such ecclesiastical dignity, should change his religion, the dignity, territorial jurisdiction, or property held by him, should not be thereby alienated from the church from which he seceded, but should be still "reserved" for that church, and for the legitimate successors of the seceder. It was chiefly out of the disputes regarding the violations of the reservatum ecclesiasticum that the thirty years' war arose.

RESERVE, in army affairs, has several meanings. First, in a battle, the reserve is a body of troops held somewhere in the rear, generally out of fire, and kept fresh, in order that they may interfere with decisive force at any point where yielding troops require support, or an advantage gained needs powerful following up. The *reserve* of ammunition is a magazine of warlike stores, situated between an army and its base of operations, sufficiently retired from the front to be safe from sudden raids of the enemy, and at the same time advanced enough to allow of the supply actually in the field being speedily replenished.

The reserve of a nation is that force upon which the national defense is thrown, when its regular armies have failed in securing its safety. This reserve may be the *levée en masse* of the whole adult male population, or it may consist of a smaller section of the people duly trained to arms. The latter is, of course, the preferable system, when the arms of scientific modern warfare are to be brought into action. In different countries the reserves are organized on very different principles. In Great Britain they comprise the army reserve, the enrolled pensioners—both of which consist of soldiers who have served in the army—the militia, yeomanry, volunteers, and trained constabulary. The numbers of the reserve forces provided for in the army estimates of 1876–77 were as follows:

Militia	139,619
Yeomanry cavalry	15,078
Volunteers	168,750
Army reserve force (including enrolled pensioners)—first-class	10,000
second-class	21,000
	354,447

Of the volunteers, 31,823 were artillery volunteers, 366 light horse, 6,295 engineers, 139 mounted rifles, 1458 permanent staff, and 128,669 rifle volunteers.

The scheme of army reorganization, which has been carried out during the past few years, has had a very important bearing on the reserve forces. In 1870 it was attempted, by modifying somewhat the conditions of enlistment into the regular army, to make the provisions for securing and maintaining a numerically strong army reserve more efficient than they had hitherto been. Enlistment continued as before to be for twelve years; but service in regiments going abroad was to be for six years, while the remaining six years' service was to be in the reserve, the men being liable to be called out like the naval reserve, and receiving a pay of 4d. a day. In 1876 men commenced to pass from the colors into the reserve, which is expected ultimately to reach about 80,000 men.

By an order in council of March 31, 1871, the power of the lord lieutenant ceases, and the management of the reserve forces in counties is vested in the ministers of the crown.

One of the objects chiefly kept in view in the comprehensive scheme of 1872 for the reorganization of the army was the bringing of the auxiliary forces into closer and more mutually helpful relations with the regular army. The main feature of that scheme is the localization of the combined military forces in certain territorial districts, so that there shall belong to each such district two line battalions, two militia battalions, and volunteers, formed into an administrative brigade, the whole to rest on the brigade depot as center. Arrangements were made to secure that a larger number of officers of the line regiments should pass into the militia and the yeomanry, and that the efficiency of the reserve should increase. The aim of the measure was "to unite the spontaneity and all the other advantages of the auxiliary forces with the highest amount of training that the regular army could furnish to any other body of men."

RESERVED LIST, in the royal navy, a device for expediting the promotion of officers who are still of an age for active service. Under certain orders in council of 1851 and 1853, old officers of good service were selected for promotion to the next grade on the reserved list. This formed a bar to any further promotion; and removed the officer from active employment, except in the remote contingency of the active list being exhausted, when these "reserved" officers would be liable to be called upon to serve. For all practical purposes, however, the reserve list was a retired list. The officers placed on it obtained the half-pay of the rank to which they were promoted, and their removal gave vacancies for the promotion of younger and more efficient men. In the navy estimates for 1876–77, while provision was made for 607 naval officers on the unemployed active list, and for 2,175 on the retired list, a sum of £44,133 was allotted to 180 naval officers on the reserved list. The list is dying out, as, under the retirement scheme of 1870, absolute retirement according to age was substituted.

RESERVOIR, a receptacle for storing water for any purpose, but chiefly for the supply of towns, for driving machinery, feeding canals, irrigation, or for some process of manufactures. Generally, every water-works' establishment, for the supply of a town, requires to construct one or more reservoirs for providing compensation to the mills situated on the stream, for the water that is abstracted from any of its feeders.

The most advantageous position for a store reservoir is that where there is a narrow gorge in a valley widening out upward into a flat expanse, thereby enabling a comparatively small dam or embankment formed in the gorge, to impound a large body of water; but in many cases where there is no such choice, the embankment may require to be placed across a wide part of a valley which narrows as it ascends, thereby requiring a great embankment, in proportion to the quantity of water impounded. Sometimes reservoirs have to be formed on flattish ground affording no great natural facilities for storing water; and in such cases they may require to be embanked wholly or nearly round and round. Where a reservoir requires to be constructed on perfectly level ground, the excavation must be calculated to be exactly equal to the embanking. The worst possible situation for a store reservoir is on the slope of a hill.

In many cases, natural lakes are used as reservoirs, means being adopted for raising or lowering the surface of the water, the difference between the lowest and the highest level of the lake's surface, multiplied by its area, being the measure of the available storage. Instances of this occur in Loch Leven, Kinross-shire, for the supply of the mills on the river Leven: in Loch Katrine and Loch Vennachar, for the supply of the city of Glasgow, and for the compensation required by the millers on the river Teith, in consequence of the abstraction of the Loch Katrine water, and in many other similar cases both for the use of towns and for water-power.

The capacity of a reservoir necessary for making nearly the whole water of a district available for use depends much on the climate. Where droughts are of long continuance, its capacity requires to be proportionately large, but generally in Great Britain a capacity of six or seven months' supply is reckoned sufficient.

As illustrative of the very different facilities afforded by different sites for storing water, an instance occurs of two reservoirs of the Edinburgh water trust, whereof one with an embankment containing 175,000 cubic yards of earthwork impounds only 17 millions of cubic ft. of water; while another, with an embankment of 53,000 cubic yards, impounds 85 millions of cubic ft., there being a single embankment across a valley in both cases. Generally, the structure for impounding water is an earthwork embankment, with a slope toward the water of 3 or 4 horizontal to 1 perpendicular, a breadth across the top of from 6 to 12 ft., the height being from 4 to 7 ft. above the water, and an outside slope of from 2 to 2½ horizontal to 1 perpendicular. The earthwork ought to be formed in thin layers well rammed, and to have a puddle-wall of good well-worked clay in the center, the foundation of the puddle being a trench dug down to impervious rock or clay. The face toward the water requires to be protected by stones; and when a reservoir is large those stones must be "pitched"—i.e., regularly set by hand—so as to be able to resist the lash of the wave. In all cases there is imperatively required a waste-weir, to allow flood-waters to escape without risk of overflowing the dam. It ought, if possible, to be placed on the solid ground; and if it can be cut through solid rock, that is best, and saves a great expense for masonry. The width of the waste-weir must be regulated by the catchment or extent of gathering-ground of the reservoir, and by the rain-fall of the district; but for a given catchment and rain-fall, a reservoir having a small area ought to have a larger waste-weir than one having a larger area, as the latter would allow flood-water to accumulate without rising to so high a level as it would in the former. Generally, however, from 12 to 20 ft. of length of waste-weir may suffice for a square mile of catchment. In some cases, dams across gorges, for the purpose of forming reservoirs, are constructed of walls of heavy masonry, instead of earthwork embankments. Those across rivers for dividing the water into mill-leads, and for retaining the water which would otherwise be wasted at meal-hours, are generally constructed of stone, but sometimes of timber or iron.

The word dam is very often used incorrectly in Scotland to indicate a reservoir or sheet of water, instead of the structure made use of to form the reservoir, which is its proper meaning. A reservoir requires a sufficient outlet at the bottom by means of a tunnel, culvert, or iron pipes provided with suitable sluices, and these ought properly to be so arranged as that access can be had to them even when the reservoir is full.

Most of the disasters from the bursting of reservoirs have arisen from the want of sufficient waste-weir, and from the embankments being overtopped in consequence by the water, and the outer slope being washed away, so as to deprive the puddle-wall of its support; but some accidents have occurred from the outlet being by a wooden box or trough through the embankment, and that being neglected and allowed to get rotten. The bursting of the Bilberry reservoir, above Holmfirth, which occurred in 1852, arose from the embankment having sunk to, and being allowed to remain at, a level actually below that of the waste-weir, so that it was overtopped; but the Bradfield reservoir embankment of the Sheffield water-works which burst in 1864, gave way before the water had risen to the level of the waste-weir; and much difference of opinion exists as to the cause, some engineers contending that the disaster was caused by bad workmanship in the embankment itself, and others that it was owing to a landslip under the embankment.

Distributing reservoirs for towns, used chiefly for storing up the surplus water during the night, which otherwise might mostly go to waste, ought to hold at least half a day's supply, and ought to be placed high enough to command the highest parts of the town. They are generally built of masonry or brick-work, but are sometimes made of cast iron, and now occasionally of boiler-plate—in which last case they are best of circular form. There is one of that description on the highest part of Edinburgh castle. In India and in the south of Europe, where long droughts prevail, very large reservoirs have been constructed for supplying water for the purpose of irrigation.

RESHD, one of the most industrious and extensively commercial towns in Persia, capital of the maritime province of Ghilan, stands on the bay of Enzelli, a lagoon on the s.w. shore of the Caspian sea, 150 m. n.w. of Teheran. It is in great part covered with trees, so that no accurate idea of its extent can be obtained by viewing it from any one point. The houses are all tiled and are neatly built, and the streets paved; water is supplied by an aqueduct, and there are a palace, vast, gloomy, and ruinous; numerous caravanseries, large bazaars, and about 1200 shops and warehouses. Indian wares are imported from Balfrech, in Mazanderan, and European manufactures from Russian Armenia. Extensive manufactures of deservedly celebrated embroideries are carried on. Pop. upward of 20,000. Enzelli, the port of Reshd, on the Caspian sea, about 18 m. distant, has 2,500 inhabitants.—Eastwick's *Diplomate's Residence in Persia* (London, 1864).

RESIDUARY LEGACY is a legacy of all that remains after the debts and legacies have been paid out of the estate of a deceased person. Debts must always be paid before legacies, and the next thing to be done is to pay all the express legacies; and as these seldom absorb the whole of the free assets, the residuary legacy is more or less valuable according as the express legacies are smaller than the free assets. If the express legacies swallow up all the funds, the residuary legacy is worth nothing.

RESHID' PASHA', MUSTAPHA MEHEMED. See REDSHID' PASHA', *ante*.

RESI'NA, a t. of southern Italy, in the province of Naples, situated at the foot of Vesuvius, and facing the sea. Pop. '71, 12,175. Resina is built on the site of ancient Herculaneum. Exquisite fruits are grown, and the famous *Lacrimæ Christi* wine is made in the vicinity. It is surrounded by country houses, and is a place of recreation for the Neapolitans on account of its salubrity. The ascent of mount Vesuvius is begun at Resina.

RES'INS, a class of natural vegetable products composed of carbon, hydrogen, and oxygen. They are closely allied to the essential oils, all of which when exposed to the air absorb oxygen, and finally become converted into substances having the characters of resin; and in most cases they are obtained from the plants which yield them, mixed with and dissolved in a corresponding essential oil. Like the natural oils the natural resins are usually mixtures of two or more distinct resins, which admit of separation by their unequal solubility in different fluids.

The following are the general characters of this class of compounds: At ordinary temperatures they are solid, translucent, and for the most part colored, although some are colorless and transparent. Some are devoid of odor, while others give off an aromatic fragrance from the admixture of an essential oil. In their crude state they never crystallize, but are amorphous and brittle, breaking with a conchoidal fracture; when pure several of them may, however, be obtained in the crystalline form. They are readily melted by the action of heat, and are inflammable, burning with a white smoky flame. They are usually described as non-volatile, but it has been recently shown that common resin may be distilled in a current of superheated steam. They are insoluble in water, but dissolve in alcohol, ether, and the essential and fixed oils. They are insulators or non-conductors of electricity, and become negatively electric by friction. Many of them possess acid properties, in which case their alcoholic solutions redden litmus. These resins combine with the alkalies, and form frothy soap-like solutions in alkaline lyes. The resinous soaps thus formed differ from ordinary soap in not being precipitated by chloride of sodium.

The resins are divisible into the *hard resins*, the *soft resins*, and the *gum-resins*.—The hard resins are at ordinary temperatures solid and brittle; they are easily pulverized, and contain little or no essential oil. Under this head are included copal, the varieties of lac, mastic, and sandarach, and the resins of benzoin (commonly called gum-benzoin), jalap, guaiacum, etc.—The soft resins admit of being molded by the hand, and some of them are viscous and semi-fluid, in which case they are termed *balsams*. They consist essentially of solutions of hard resins in essential oils, or admixtures of the two. They become oxidized and hardened by exposure to the air into the first class of resins. Under this head are placed turpentine, storax, balsam of copaiva, and the balsams of Canada, Peru, and Tolu.

The gum-resins are the milky juices of certain plants solidified by exposure to the air. They consist of a mixture of resins and essential oils with a considerable proportion of gum; and on this account, when rubbed up with water, they yield a turbid or milky fluid from the dissolved gum, retaining the resin and oil in suspension, and are only partly soluble in alcohol. Some of them, as ammoniacum, assafetida, euphorbium, galbanum, gamboge, myrrh, olibanum, etc., are valuable medicinal agents; while others, as caoutchouc (or india-rubber) and gutta-percha, are of great value in the arts and in manufactures.

The resins are very widely diffused throughout the vegetable kingdom. But there are certain families of plants which are especially rich in them. They are generally obtained by making incisions into the wood of the trees which produce them; sometimes, however, they exude spontaneously, and in other cases require to be extracted from the wood by boiling alcohol. The crude resins are separated from the essential oils with which they are usually mixed by distillation with water, the resin remaining while the oil and water pass off; and from the gummy and mucilaginous matters by alcohol, which dissolves out the pure resins, which can be precipitated from their alcoholic solution by the addition of water.

The resins are extensively employed in medicine; and in addition to the almost innumerable applications of caoutchouc and gutta-percha, various resins are of service in the preparation of varnishes, soaps, pigments, artificial light (resin-gas), etc.

Various fossil resins are known, of which the most important is amber. Some chemists place bitumen and asphalt among this class; and among the fossil resins described by mineralogists may be mentioned fichtelite, hartite, idrialite, ozokerite, scheererite, xyloretin, etc.

The common resin, or rosin, of commerce exudes in a semi-fluid state from several species of pine, especially *pinus tæda*, *P. mitis*, *P. palustris*, and *P. rigida* of North America, *P. pinaster*, *P. pinea*, and *P. laricio* of southern Europe, and *P. sylvestris* of northern Europe. The process of collecting it is very simple: a longitudinal slice of the bark and wood, about a foot in length, is taken off by means of an axe with a curved blade, and at the bottom of the groove thus made a small piece of bent wood or thin metal, as tin or zinc, is driven into a curved cut made by one blow of the axe; this forms a sort of spout, which catches the liquid resin as it runs from the wound, and guides it into a small pot made of common clay burned. At certain periods these pots are emptied, and their contents put into casks for transport to the distilleries, where the volatile essential oil is removed from the resin. The resin thus procured is used very extensively in the manufacture of common yellow soap, also for sizing paper and various other purposes, including the preparation of ointments and plasters in pharmacy.

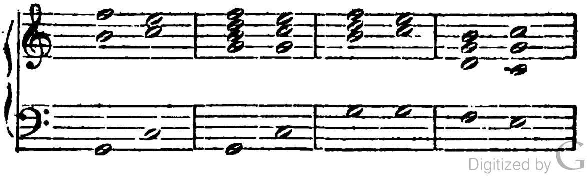
The other resins most generally known and used in Europe are anime (q.v.), copal (q.v.), dammar (q.v.), mastic (q.v.), sandarach (q.v.), frankincense (q.v.), lac (q.v.). In addition to these there are many which are of essential service in other countries, as the piny resin or dhoop, obtained from *vateria indica;* black dammar, obtained from *canarium strictum;* saul resin, or dammar batu, from *shorea robusta*—all of which serve many useful purposes in India, China, Japan, and other Asiatic countries. The forests of South America furnish many others.

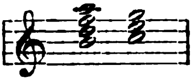
RESISTANCE OF FLUIDS, the opposing force given by liquids and gases to bodies resting in or on them or moving through them. Much of the principles included are embraced in *hydrostatics* (q.v.). As water presses in all directions alike at any point, it follows that when a floating body is at rest the pressure which it exerts in a downward direction is exactly balanced by the upward pressure of the water beneath it, and this will be irrespective of the shape of the body. If, however, the body is made to move through the water, the resistance of the water, and therefore of the power which must be applied to the body, will vary according to the shape of the moving body. This is illustrated in the forms of sailing and other vessels. Those which are blunt at the bow and stern are hard and slow sailers. They may be sharp at the bow, but if blunt or square at the stern the great tendency to create a vacuum at that point will retard the motion of the vessel. If the lines are very sloping the water freely passes to the rear with little retarding power. The resistance of a fluid to a body moving through it is proportional to the square of the velocity, so that in general terms a body moving 4 ft. per second would require four times as much power to propel it as if moving 2 ft. per second ($4^2 = 16$ and $2^2 = 4$). The resistance of air follows the same law, except for great velocities, as in the case of projectiles, when the condensation produced in the air increases the resistance still more. Many accurate experiments have been made in the French army and navy, particularly by M. Thibault and gen. Morin. From their experiments it was found that the resistance of air to the movement of a plane surface at a velocity of one yard per second is 0.1295 pounds per square yard, when the surface is perpendicular to the direction, and that the pressure increases or decreases very nearly in proportion to the square of the velocity. The shape also of the solid has very nearly the same influence as when it moves through water.

RESISTING A CONSTABLE is an offense punishable by justices of the peace in a summary manner.

RES JUDICATA, in law, means that the subject-matter of an action has been already decided by a court of competent jurisdiction, and if so, a plea setting up the *res judicata* is a sufficient defense. In order to be binding, however, the suit in the former case must have been between the same parties.

RESOLUTION, in music. In the progression of chords in a musical composition, there are certain chords that require to be followed by certain others, or, as it is called, *resolved* into them, otherwise, a sense of incompleteness is left on the ear. Thus the chord of the dominant seventh must be resolved by the tonic harmony, the major third ascending a semitone to the key-note, and the seventh descending one degree to the third of the key:





The diminished triad is similarly resolved, and all chords immediately derived from the dominant harmony. The chord of the added ninth is resolved by descending a second to the fifth of the tonic.

RESOLUTION OF FORCES. See COMPOSITION.

RESOLUTIVE CLAUSE is the technical name given by the law of Scotland to a clause in a deed of entail, the object of which is to declare that if the heir of entail in possession do any of the things which he is expressly prohibited from doing, such as attempting to sell the estate, or alter the order of succession, his right to the estate shall cease, and the estate shall pass on to the next heir.

RESPECTING—RESPECTANT, in heraldry, a term used to describe two animals borne face to face. Beasts of prey rampant when so borne, are, however, said to be *rampant combatant.*

RESPIRATION, ORGANS AND PROCESS OF. The great objects of respiration or breathing are, first. the introduction into the system of oxygen, by which the products resulting from the disintegration or breaking up of the muscular, nervous, and other tissues of the body are converted into compounds, which are easily eliminated or removed by the excreting organs (as the kidneys, lungs, skin, etc.); and, secondly, the removal of the most noxious, and consequently, the most important of these products, carbonic acid, through special respiratory organs, which, in most air-breathing animals, except insects, are lungs; while in water-breathing animals, excepting those very low in the scale of organization, they take the form of *branchiæ*, or gills. In all the vertebrated animals, excepting in fishes, and in the amphibians during their young state,* the respiratory organs are more or less complicated internal air-sacs, communicating through the throat with the external atmosphere. The simplest known form in which these LUNGS or internal air-sacs exist is as a pair of elastic membranous bags placed close beneath the vertebral column, communicating with the surrounding atmosphere by a tube known as the windpipe, or *trachea*, which opens through the larynx, or organ of voice, into the throat. These bags are lined by a delicate, thin, and moist membrane, called a mucous membrane, embedded in, and partly beneath which is a vascular network, through which all the blood in the animal's body is in turn driven by the heart. The moist partition between the blood in this network and the air in the interior of the lungs is so thin, that after having (by its moisture) dissolved the oxygen of the air, it permits of its passage into the moving current of blood, whilst through the same agencies carbonic acid simultaneously passes in an opposite direction from the blood into the air. To complete the apparatus, there are certain muscles under whose action the bags are emptied of their vitiated contents and refilled with pure air. Such are the respiratory organs as they occur in that remarkable animal, the *proteus anguinus*, found in the dark caves of Carinthia, and belonging to the order *amphipneusta*, referred to in the foot-note. In the more highly organized animals and in man, we find these elementary essential parts complicated and modified in a great variety of ways. Confining our remarks for the present to the respiratory process as it occurs in man and mammals, we may consider the anatomical details under three different heads. *First*, there must be a special respiratory organ—the lungs—affording by its internal arrangement an immense extent of internal surface, covered by vascular net-work, through which the blood flows in innumerable minute streamlets, only separated by an extremely thin membrane from the atmospheric air that has been inhaled; *secondly*, there must be such an arrangement of the circulating system that fresh blood may be perpetually driven from the right side of the heart through the lungs, and onward to the left side of the heart; and *thirdly*, there must be arrangements for the frequent and regular change of the air contained in the lungs. These three points will be considered in the order in which we have placed them.

A sufficiently large internal aërating surface might of course be obtained by increasing the size of the air-bags themselves, but this would involve an increase of size in the animal. In examining the lungs of different animals, two plans are observed for increasing the internal surface without increasing the total bulk of the lungs. According to one plan, the internal surface is, as it were, molded into cells, separated laterally by partitions, somewhat like the cells as seen in a section of honeycomb, or more like the appearance presented by the second or honeycomb stomach of ruminating animals; according to the other, enormous multitudes of little lung-sacs partitioned, as will be presently shown, in their interior, are clustered round the ultimate branch of a common air-tube, which communicates with all of them. If we can conceive a bunch of grapes with its stem and all its minute branches, and the grapes attached to the ends of these branches completely hollow, we get a good idea of this second plan, except in so far as the partitioning of the terminal cells is concerned. By the former method, which occurs in amphibians and reptiles, the lung-sacs are merely rendered more cellular in their interior; while, by the latter plan, compound lungs are formed, such as occur in birds and mammals, including man. Hence these two varieties of lung-structure correspond to the so-called cold-blooded and warm-blooded animals respectively. In the lungs of the frog and the lungs of the turtle, we have illustrations of the first plan (the cellular lung-sac), while in figs. 1 and 2 we have diagrammatic illustrations of the human lung. Fig. 1 is a shaded diagram (copied from Mr. Marshall's admirable series of *Physiological Diagrams* to show the ramifications of the air-tubes in the human lungs. L is an outline representing the left lung; T, the main air-tube, called the windpipe or *trachea* (so called from the Greek word *tracheia*, rough, and similarly termed in Latin the *arteria aspera*, although not an artery, as we now employ the word), descends through the neck from the larynx or organ of voice into the chest; B shows the right and left *bronchi*, or primary divisions into which the windpipe separates, one for each lung. Each bronchus enters the lung at the so-called root, and divides and subdivides into smaller branches, which never coalesce, but continue separate, like the branches and twigs of a tree. These are the *bronchial tubes*, or the *bronchiæ* of some writers; the smallest shown in this diagram, *b*, *b*, undergo many further subdivisions, until (to use Mr. Marshall's own description) "at length they form an immense number of minute tubes, not more than $\frac{1}{70}$th of an in. in diameter, each of which ends in a cluster of cells, or, as it may otherwise be described, opens into a small membraneous sac, a little wider than itself, having a cellular internal surface very similar to that of the frog's lung, but of course on a microscopic scale." In fig. 2 (also copied from Mr. Marshall's diagrams) there is a representation, magnified about 100 diameters, of three of these clusters of cells, or little lung-sacs, from the human lung. In this figure, *b* is a small air-tube, or bronchical tube, from which several of the finest or ultimate tubes proceed; *c* shows the outer surface of one of the lung-sacs, or *lobules*, as they are commonly termed; *d*, the inner surface of another, which has been cut open, so as to show the ultimate recesses of the lung to which the air has access—viz., the *air-cells*. According to Rossignol, the ultimate bronchial ramifications terminate in a shape resembling that of an inverted funnel, and hence he applies the term *infundibula* to these endings. In fig. 3 (copied from Rossignol's *Memoir*) there is a representation of the termination of an ultimate bronchial tube in the lung of a dog: *a* represents an ultimate tube, or lobular passage, branching toward the infundibula; *b* is the interior of one of the seven infundibula shown in the figure; while *c* represents one of the numerous septa or partitions projecting inward on the infundibular wall, and forming the air-cells. According to Todd and Bowman, the diameter of the lobular passages is from $\frac{1}{100}$th to $\frac{1}{200}$th of an in., while that of the cells ranges from $\frac{1}{200}$th to $\frac{1}{800}$th of an inch. It is on the inner surface of these air-cells that the net-work of minute capillaries is spread in which the act of aëration takes place. Each lobule receives air through its own bronchial tube alone, and consequently there is no direct communication between the air-cells of adjacent lobules. These lobules are closely compressed upon one another; and collectively, together with the connective tissue which unites them to one another, make up the great mass of the lungs. To such an extent is the process of subdivision carried out, that, according to calculation, the lungs of an adult man contain at least 600 millions of these air-cells. It is in consequence of the air included in these cells that the pulmonary tissue has a soft spongy feel, and crackles when compressed between the fingers (see RESPIRATORY SOUNDS); and for the same reason, the lungs, and even small portions of them, even after strong pressure, float in water, it being extremely difficult to drive all the air out of the cells. The lungs (except in the fetal state, when no air

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* A few of the amphibians, such as the species of the genera *Proteus* and *Siren*, retain their branchiæ during their whole life: hence they are placed in the order *amphipneusta*, a term indicating their double mode of breathing.

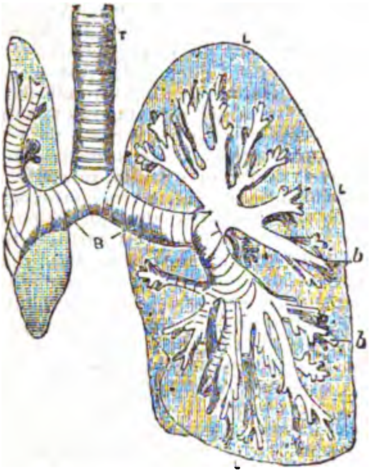

FIG. 1.

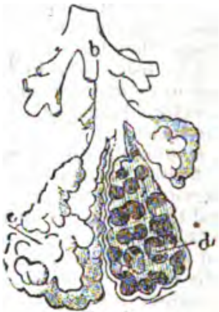

FIG. 2.

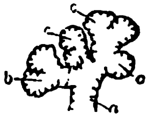

FIG. 3.

enters them) are thus the lightest organs, in relation to their size, in the body. Although their bulk is so great that, with the heart, they occupy almost the whole of the cavity of the chest, they only weigh about three pounds and a half in men, and two pounds and three-quarters in women. Their color varies at different ages. At birth, they are of a pinkish white tint; in adult life, they are of a slate color, and present a mottled appearance; and in old age, they become of a still darker tint. The polygonal markings which are seen on the surface correspond to the outer surface of the lobules already noticed. Their shape is adapted to that of the cavity in which they are lodged, each lung being conical in form, with its apex rising into the neck; while its base, which is broad and concave, rests upon the convex surface of the diaphragm; and between the two lungs lie the heart and the great vessels that proceed from it. During life (except in certain diseases, as for instance, pericarditis (q.v.), the inner margins of the lungs nearly overlap the heart, leaving only a roundish space, less than 2 in. in diameter, of that organ uncovered, while their lower borders extend to the cartilages of the ribs, and fit into the angle formed between those cartilages and the diaphragm. Each lung is invested by its own serous membrane, the pleura (q.v.), which serves the double purpose of facilitating the movements which the lungs undergo in the act of respiration, and of suspending each lung in its proper position. In the latter function, the pleuræ are essentially assisted by the great air-tubes and blood-vessels, which collectively form what are termed the roots of the lungs.

The structure of the air-tubes and the lungs themselves next requires consideration. Beginning with the upper portion, we have to consider the *trachea*, or windpipe, which in the human subject descends in the middle line from the larynx (q.v.) to the level of the third dorsal vertebra, where it divides into the right and left bronchi. It is kept permanently open by from 16 to 20 cartilaginous rings, which surround two-thirds of the tube, and are incomplete behind, where the tube is completed by the same fibrous membrane which covers and unites the cartilages in front and on the sides. In this fibrous membrane are numerous tracheal glands (which probably furnish much of the vapor of the breath, and may occasion its odor), together with unstriped muscular fiber, to which the term *trachealis* muscle has been given. The trachea measures about 4½ in. in length, and is about three-quarters of an in. wide. Its mucous membrane is continuous through the glottis with that of the pharynx or throat, and is covered with ciliated columnar epithelium (q.v.). Of the bronchi, the right is wider, shorter, and more horizontal than the left. Their walls are composed on the same plan as those of the trachea. Upon entering the lung, each bronchus divides in the method already described. The walls of these bronchial tubes become thinner as they approach the air-cells. The cartilaginous portions which, in the primary divisions of each bronchus, partially retained the annular form, become gradually reduced to mere flakes, and finally cease in tubes of $\frac{1}{8}$th or $\frac{1}{10}$th of an in. in diameter. The unstriped muscular fibers occurring in the trachea are continued downward to the minutest tubes, forming a very thin layer, completely surrounding the canal, and the ciliated epithelium extends equally far. The terminal bronchial tube loses its epithelium and muscular coat at about $\frac{1}{4}$th of an in. from the most distant air-cell to which it leads, and is thus reduced to a single coat, consisting of the basement membrane (see MUCOUS MEMBRANE), with yellow elastic fibers blended with it. Of this structure, the interlobular passages and the air-cells are composed.

The mode in which the blood is perpetually changed in the lungs next demands consideration. The venous or impure blood, collected from all parts of the body in the right side of the heart, is conveyed to the lungs by the pulmonary artery, which is about the size of the aorta, and, like that vessel, is furnished with three semilunar valves at its origin, which prevent the blood from regurgitating into the right ventricle of the heart (see CIRCULATION). The pulmonary artery divides, before entering the lungs, into a right and a left branch, which ramify as far as the lobules in company with the bronchial tubes. At this point, they distribute themselves on the outside of the lobules, in the so-called *interlobular fissures*, and penetrating between the air-cells, form a capillary network on and in the walls of the cells and of the lobular passages. This network empties its blood, which is now aerated, into minute venous radicles which converge to form larger veins, and these finally form the four pulmonary veins, which discharge their arterialized blood into the left side of the heart. The walls which support the capillary network of the lungs are (as Todd and Bowman observe) "for the most part much too thin to inclose the capillaries between the two layers of their substance, and therefore the capillaries project fairly into the air-cells by a great part of their circumference, being adherent to the wall by a narrow line only. The capillary wall is thus exposed and bare, in contact with the air of the cell, and nothing besides the delicate membrane of the capillary intervenes between the air and the blood. A capillary frequently passes through an aperture in the cell-wall, so as first to project into one cell, and further on into a contiguous one, but never becomes altogether free from the wall."—*Phys. Anat.* v. ii. p. 393. The diameter of these capillaries is about $\frac{1}{1800}$th of an in., which is comparatively large, and admits of the passage of blood freely; and the air and the blood may be said to be in contact, since they are only separated by a delicate capillary wall, less than $\frac{1}{30000}$th of an in. in thickness. If the rate of the blood in the capillaries be taken at an in. and three-quarters per minute (according to the estimate of Valentin, drawn from observation of the frog's foot), it has been calculated that the blood would at each circuit remain in contact with the air about one second and a half. In all probability, however, the motion of the blood is quicker in the pulmonary capillaries of man and other mammals and of birds than in those of the frog's foot.

In addition to the pulmonary artery and the pulmonary veins, which convey the blood to and from the lungs for the purpose of aeration, there are other vessels, known as the bronchial vessels, for the nutrition of the lung itself, the distribution of which, and their mode of communication with the pulmonary vessels already described, have been subjects of much discussion; but into this we need not enter. The lungs are supplied with nerves from the anterior and posterior pulmonary plexuses, lying at the root of the organ, and composed of filaments of the pneumogastric and sympathetic nerves. The filaments from these plexuses accompany the bronchial tubes, in which they are finally lost. The part which these nerves play in the respiratory process will be considered after we have described the *movements of respiration*, by which the air in the lungs is being perpetually changed.

For a description of the shape and framework of the chest, see CHEST. The chest (or thorax, as it is termed by anatomists) is so constructed as to be capable of enlargement in height (vertically), in depth (or from the front backward), and in width (or from side to side. Its height is increased mainly by the descent of the diaphragm, and to a certain extent by the elevation of the ribs, and the widening of the intercostal spaces; while its depth and width are increased by the elevation of the ribs, which carry forward and elevate the breast-bone (or sternum), especially at its lowest end, and are slightly rotated on an imaginary axis, joining their extremities, by which their central portion is raised, and slightly removed from the mesial plane of the chest. It is only in forced or deep inspiration that all these means of enlarging the chest are called into play. An ordinary inspiration is attended in men with very slight elevation of the ribs (about one-twentieth of an inch), while in women the elevation is much greater, especially in the upper ribs; the cause of this difference in the sexes probably lying in the narrower waist of the female requiring a compensation in the upper part of the chest. MM. Beau and Maissiat describe three varieties of ordinary respiration—viz.: 1. Abdominal, or that chiefly effected by the diaphragm, and seen in the motion of the walls of the belly; 2. Costo-inferior, or that in which the seven lower ribs are observed to act; and 3. Costo-superior, or that effected in a considerable degree by the upper ribs. The first variety occurs in infants up to the end of the third year, and in males generally; the second in boys after the age of three, and in men; and the third in adult females. Our limited space precludes a detailed notice of the various muscles which are concerned in respiration. The total power of the respiratory muscles has been measured by several physiologists, among whom Dr. Hutchinson deserves special notice. He finds, as the average of 1500 experiments, that the power of expiration is nearly one-third stronger than that of inspiration, and he is of opinion that when the expiratory are not stronger than the inspiratory muscles, some disease is present. He tested the force of the two classes of respiratory muscles by causing persons to make the most powerful efforts of which they were capable, when breathing through the nose into an instrument termed a spirometer, and by this means he found that men of 5 ft. 7 or 8 in. in height have the greatest inspiratory power, it being equal. on an everage, to a column of mercury of 2.75 in., while their expiratory power was equal to 3.97 inches. The following table is given by him as exhibiting the range through which these powers may vary within the limits of health:

Power of Inspiration.		Power of Expiration.
1.5 inches	**Weak**	2.0 inches.
2.0 "	**Ordinary**	2.5 "
4.5 "	**Remarkable**	5.8 "
7.0 "	**Very extraordinary**	10.0 "

The co-operation of the resilience of the lungs and the elasticity of the walls of the chest with the expiratory muscular movement, is probably the cause why the expiratory power, as tested by the height of a column of mercury, is greater than the inspiratory power. Dr. Hutchinson calculates that a man who raises 3 in. of mercury by an effort of inspiration exerts a force equal to 1000 lbs.; while the one remarkable case in which the mercury rose to 7 in., indicated a force of 2200 lbs., or nearly one ton.

The following points in connection with the respiratory movements require notice. Every complete act of respiration is divisible into four parts—viz.: 1. Inspiration; 2. A short pause, not always observed; 3. Expiration; and 4. A considerable pause, occupying, according to Vierordt, about one-fifth of the whole time required for one complete respiratory act. The act of expiration is always more prolonged than that of inspiration, the former being to the latter in the ratio of 12 : 10 in adult males, and as 14 : 10 in children, women, and aged persons. The number of respiratory acts performed in a minute varies at different ages. According to Quetelet, at birth there are 44 respirations in one minute; at 5 years of age, 26; from 15 to 20, 20; from 20 to 25, 18.7; from 25 to 30, 16; from 30 to 50, 18.1: so that from 16 to 20 may be taken as the ordinary range for healthy adults, although Hutchinson gives the wide range of from 6 to 40. The average ratio which the number of respirations bears to the number of pulsations in a given time is about 1 : 4½, and if there is any great deviation from this ratio, there is probably some obstruction to the aëration of the blood, or some disorder of the nervous system. Thus, in pneumonia (or inflammation of the lungs), in which a greater or less amount of pulmonary tissue is unfitted for its office, the number of the respirations increases in a more rapid proportion than the number of pulsations, so that the ratio becomes as 1 : 3, or even as 1 : 2. In hysteria, a similar or even greater deviation from the normal ratio may occur; and Elliotson records a case in which the respiratory movements were 98, or even 106, while the pulse was 104. On the other hand, in certain typhoid conditions, and in narcotic poisoning, the respiratory acts are diminished in number; the ratio of respiration to pulsations being as 1 : 6, or even 1 : 8.

We have next to inquire into the mode in which the muscular movements of respiration are kept up by nervous power. "There can be no doubt," says Dr. Carpenter, "that these movements, though partly under the control of the will, are essentially 'automatic' in their nature. Their chief centers consist of two ganglia; corresponding to the origins of the pneumogastric nerves, which are the principal excitor nerves which convey the stimulus on which these movements are dependent; whilst from the adjacent parts of the medulla oblongata and spinalis proceed the chief motor nerves by which they are carried into effect. And thus it happens that the whole of the encephalon may be removed from above, and the spinal cord (as far up as the origin of the phrenic nerve) from below, without suspending the most essential of the respiratory movements." —*Principles of Human Physiology* (6th ed., 1864, p. 274). It would carry us far beyond our assigned limits to notice the interesting series of phenomena that follow the division or irritation of the various branches of the pneumogastric nerve. We may, however, mention that when the trunks of this nerve are divided on both sides, the respiratory movements still go on, although with diminished activity. Hence, there must be other excitors to the action of the respiratory muscles. Amongst these the nerves distributed to the general surface, and particularly to the face, probably perform an important part; and in exciting the first inspiration, the fifth pair seem the principal agent. In support of this view, Dr. Carpenter adduces the well-known fact, that the first inspiratory effort of the new-born infant is most vigorously performed when the cool external air comes in contact with its face. Dr. Marshall Hall, in his *New Memoir on the True Spinal Marrow*, p. 29, relates a case in which the first inspiration was delayed simply because the face was protected from the atmosphere by the bedclothes; the instant they were lifted up, the infant breathed. Many familiar facts demonstrate the influence of the superficial nerves on the respiratory system in the adult as well as in the infant. "Every one," to use Dr. Carpenter's words, "knows that the first plunge into cold water, or the first descent of the stream of the shower-bath, or even the dashing of a glass of cold water in the face, will produce inspiratory efforts; and this fact has many important practical applications. Thus, in the treatment of asphyxia, whether congenital or the result of narcotic poisoning, drowning, etc., the alternate application of cold and heat is found to be one of the most efficacious means of restoring the respiratory movements, and a paroxysm of hysterical laughter may be cut short by dashing a glass of cold water in the face." The principal motor or efferent nerves concerned in bringing out the respiratory movements are the phrenic, going to the diaphragm; the intercostal, supplying the intercostal muscles; the facial and the spinal accessory nerves; although, as has been already mentioned, the superficial nerves generally exert a motor or efferent action.

How far the respiratory movements are under the influence of the will is a question which has given rise to much discussion. That, in their ordinary mode of performance, they are independent of the will, is obvious from their systematic occurrence during sleep, in cases of paralysis in which the power of the will is lost, in apoplexy, etc. At the same time, universal experience teaches us that these movements are partly, but not entirely under the control of the will. We can with little inconvenience, suspend the respiratory actions for a minute, or even longer, if we have previously introduced into the lungs a full supply of fresh air; but if the suspension be further prolonged the stimulus conveyed by the excitor nerves to the nervous centers becomes so strong, that by no effort of the will can we avoid making inspiratory efforts. It is asserted by M. Bourdon, an eminent French physiologist, in his *Recherches sur le Mécanisme de la Respiration*, that no person ever succeeded in committing suicide by simply holding the breath, but that such persons have attained their object by holding the face under water, because here another set of muscles is called into play, which are much more under the control of the will than those of respiration. If we may venture to seek for the reason why, in man and the higher animals, the respiratory actions are placed under the direction of the will, it may probably be found in the necessary physiological connection that exists between them and the production of those vocal sounds by which individuals (whether men or animals) can communicate their feelings and wishes to one another.

We shall complete the subject in so far as human physiology is concerned, by noticing (1) the greatest quantity of air that can be expelled by a forcible expiration; (2) the total quantity that passes through the lungs in a given time; (3) the effects of respiration on the air; and (4) the effects of suspension or deficiency of respiration.

When the lungs have been emptied as much as possible of air by the most powerful expiratory effort, they still contain a quantity over which we have no control, and which may be estimated at about 40 cubic inches.* To this portion of the contents of the lungs the term *residual air* is applied. In addition to this residual air, physiologists distinguish, in connection with the respiratory process, *supplemental air*, which is that portion which remains in the chest after an ordinary gentle expiration, but which may be displaced at will; *breathing or tidal air*, which is the volume that is displaced by the constant gentle inspiration and expiration; and *complemental air*, or the quantity which can be inhaled by the deepest possible inspiration, over and above that which is introduced in ordinary breathing. The greatest volume of air that can be expelled by the most powerful expiration, which is obviously the sum of the supplemental, breathing, and complemental air, is designated as the *vital capacity*—a term originally introduced by Dr. Hutchinson, the inventor of the spirometer, who found, from nearly 5,000 observations, that of all the elements or factors which might be supposed to influence it, *height* alone stood in a definite and constant relation to it, this relation being expressed by the rule, that, "for every inch of stature from 5 to 6 ft., 8 additional cubic inches of air (at 60° Fahr.) are given out by a forced expiration after a full inspiration." Thus, the vital capacity for a man from 5 ft. to 5 ft. 1 in. being 174 cubic in., that for a man from 5 ft. 1 in. to 5 ft. 2 in. is 182 cubic in.; and so on. With regard to bodily weight as a factor, Dr. Hutchinson found, that "when the man exceeds the average weight (at each height) by 7 per cent., the vital capacity decreases 1 cubic in. per lb. for the next 35 lbs. above this weight." Age and muscular development do not influence the result so much as might have been expected. It has been not unfrequently observed that the vital capacity is small in athletic men, and that it has been in excess in persons by no means remarkable for physical power The *maximum* vital capacity met with by Dr. Hutchinson was 464 cubic in.; this was in a man 7 ft. high, whose weight was 308 lbs.; the *minimum* was 46 cubic in., and occurred in the case of a dwarf whose height was only 29 in., and who weighed 40 lbs.

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* **According to Hutchinson, as will be presently seen, this estimate is far too small.**

In estimating the effects of the respiratory process upon the air which passes through the lungs, we shall adopt the *data* afforded by the recent observations of Dr. Edward Smith, who has arranged a spirometer by which the quantity of air inspired may be registered from 1 to 100,000 cubic in., and therefore for any period. This instrument, says Dr. Carpenter (to whom Dr. Smith has communicated many of the following statements for insertion in the new edition of his *Human Physiology*), "he has used for 24 hours without intermission, except for meals, and he has ascertained the quantity of air inspired during sleep and in almost every condition met with during the day. From numerous experiments upon several persons, each extending over a whole day, he found that the average depth of inspiration was 33.6 cubic in. when at rest; and when walking at 1, 2, 3, and 4 m. an hour, 52, 60, 75, and 91 cubic in., and even 107 cubic in. when working the tread-mill. If we take 30 or 40 cubic in. as the average quantity exchanged at each respiration, we cannot but observe how small a proportion it bears to the entire amount which the lungs usually contain, for the 'residual air' which cannot be expelled is estimated by Dr. Hutchinson at from 75 to 100 cubic in.; and the 'supplemental air,' which can only be expelled by a forced expiration, is about as much more; the sum of the two being from 150 to 200 cubic in., or from 5 to 7 times the 'breathing volume.'" Now, it is obvious that if no provision existed for mingling the air inspired with the air already occupying the lungs, the former would penetrate no further than the larger air passages, and as this would be again thrown out at the next expiration, the bulk of the air contained in the lungs would remain altogether without renewal, and the expired air would not be found to have undergone any change. The law of the *diffusion of gases* (q.v.) here comes in play, for the air in the air-cells and finer tubes being charged by the respiratory process with a great excess of carbonic acid, as compared with the inspired air contained in the larger tubes, a diffusion of the carbonic acid necessarily takes place in the outward direction, while the oxygen from the air, or the air itself, similarly diffuses itself in an opposite direction, toward and into the air-cells themselves.

The *total amount* of air which passes through the lungs in 24 hours must obviously vary with the extent and frequency of the respiratory movements. Dr. Smith found that during the day (6 A.M. to 12 P.M.), the average quantity of air inspired by several persons at rest was 502 cubic in. per minute, or a total of 542,160 cubic in.; and as the average quantity during the night was about 400 in. per minute, the total daily amount was 686,000 cubic inches. This quantity is largely increased by exertion, and Dr. Smith computes that the total amount actually respired by the unoccupied gentleman, the ordinary tradesman, and the hard-working laborer, would be 804,780, 1,065,840, and 1,568,390 cubic in. respectively.

The *alterations* in the inspired air effected by respiration consist essentially in the removal of a portion of the oxygen, and its replacement by a nearly corresponding bulk of carbonic acid. The amount of carbonic acid in the expired air varies inversely with the number of respirations; it reaches 5.5 per cent (or more) when the respirations are only 6 in the minute, while it falls as low as about 2.6 per cent when the respirations are 96 in the minute. About 4.35 per cent of carbonic acid is, on an average, added to the air in ordinary respiration; while about 4.782 per cent of oxygen is removed; the actual diminution of bulk of the expired air (after the removal of the moisture obtained from the lungs) being about $\frac{1}{40}$th of its volume. Hence, unless where there is free ventilation, the air in an apartment containing men or animals must soon become vitiated by containing a great excess of carbonic acid (for ordinary atmospheric air only contains about one part of carbonic acid in 2,500 parts), and a deficiency of oxygen. The absolute quantity of carbonic acid (and consequently of carbon) exhaled in 24 hours is liable to great variations, caused by the temperature and moisture of the air, age, sex, muscular development, the nature and quantity of the food, muscular exercise, sleep, state of health, etc. Dr. Smith calculates that an adult man in a state of rest exhales in 24 hours an amount of carbonic acid equivalent to 7.144 oz. of carbon; and he estimates that it should be increased to 8.68 and 11.7 oz. for the non-laboring and laborious classes respectively, at their ordinary rate of exertion. We may add, that the total amount of carbonic acid is greatly increased by external cold, and diminished by heat; that it is increased by a moist, and diminished by a dry atmosphere; that it increases in both sexes to about the 30th year, when it remains stationary for 15 years, after which it diminishes; that at all ages beyond 8 years it is greater in males than in females, and that it increases during pregnancy; that it is greater in robust that in slender men, the quantity of carbon expired per diem to each 1 lb. of bodily weight being (according to Smith) 17.07, 17.51, and 17.99 grains at 48, 39, and 33 years of age respectively; that it is greatly increased by eating,* and is diminished by fasting; that it is increased by muscular exertion (Smith found that when walking 3 m. an hour he excreted 2.6 more carbonic acid than when at rest; while tread-wheel labor occasioned about double the excretion that was caused by walking); that it was diminished by sleep; and that it is increased in the exanthematous fevers (measles, small-pox, scarlatina, etc.), and in chlorosis; while it is diminished in typhus and in chronic diseases of the respiratory organs.

There has been much discussion with regard to the extent to which the nitrogen of the air is affected by respiration. Usually a small amount of this gas is given off, but the quantities absorbed and exhaled so nearly balance each other that its special action on the organism must be very trifling, further than as being a diluter of the oxygen, which would be too stimulating if breathed in a pure state. We therefore proceed to the consideration of the watery vapor with which the exhaled air is saturated. The amount of this fluid exhaled in 24 hours may range from about 6 to 27 oz., its usual range being between 7 and 11 oz. It is not pure water, but holds in solution a considerable amount of carbonic acid and an albuminous substance in a state of decomposition, which, on exposing the fluid to an elevated temperature, occasions a very evident putrid odor.

RESPIRATION, ARTIFICIAL, is required in all cases of suspended animation, from drowning, noxious gases, chloroform, etc. It may be performed either by forcing air into the lungs by means of a pipe passed through the mouth or the nostril into the glottis, or (which is usually preferable) by imitating the natural expansion of the chest by muscular effort, as by the methods invented by the late Dr. Marshall Hall and by Dr. Sylvester.

The best mode of forcing air into the lungs is by the use of a small pair of bellows, with the nozzle inserted in one of the patient's nostrils. The air should be driven into the lungs with extreme gentleness, the larynx being pressed backward against the spine, so that the air may not go into the esophagus and stomach. Gentle but firm pressure must be then applied to the chest to expel the introduced air, and fresh air again driven in; and this process of introducing and expelling the air alternately must be continued until either natural respiratory efforts appear, or the case becomes hopeless.

In the article ASPHYXIA, it is stated that one of the best methods of filling the lungs of an asphyxiated person with fresh air, is that of Dr. Marshall Hall. Dr. Sylvester's method (*The True Physiological Method of Restoring Persons apparently Drowned or Dead, and of Resuscitating Still-born Children;* London, 1859) is, however, generally regarded as decidedly preferable to that of Dr. Marshall Hall, although the same in principle. The following are Dr. Sylvester's rules, as slightly modified by a committee, whose investigations will be presently noticed. The patient is laid on his back on a plane, inclined a little from the feet upward; the shoulders are gently raised by a firm cushion being placed under them; the tongue is brought forward, so as to project a little from the side of the mouth. The operator then grasps the patient's arms just above the elbows, and raises them till they nearly meet above the head. This action imitates inspiration. The patient's arms are then turned down, and firmly pressed for a moment against the sides of the chest. A deep expiration is thus imitated; and these two sets of movements should be perseveringly continued at the rate of about 15 times in a minute.

Special reference must be made to two important documents among the publications on this subject. The first of these is the *Reports of the Scientific Committee on Suspended Animation*, presented to the royal medical and chirurgical society of London in July, 1862: and when it is stated that this report was signed by "C. J. B. Williams, *chairman*, W. S. Kirkes, George Harley, J. B. Sanderson, C. E. Brown-Sequard, H. Hyde Salter, E. H. Sieveking, and W. S. Savory, *honorary secretary*," its scientific claims to our attention are undeniable. The following are their suggestions in relation to treatment: 1. That all obstruction to the passage of air to and from the lungs be at once, so far as is practicable, removed; that the mouth and nostrils, e.g., be cleansed from all foreign matters or adherent mucus. 2. That in the absence of natural respiration, artificial respiration by Dr. Sylvester's method (as already described) should be employed. 3. That if no natural respiratory efforts supervene, a dash of hot water (120° F.) or cold water be employed, for the purpose of exciting respiratory efforts. 4. That the temperature of the body be maintained by friction, warm blankets, the warm bath, etc. [whether the warm bath is serviceable or positively hurtful is, however, still an open question]; and 5. That in the case of drowning, in addition to the foregoing suggestions, the following plan may, in the first instance, be practiced: Place the body with the face downward, and hanging a little over the edge of a table, shutter, or board, raised at an angle of about 30°, so that the head may be lower than the feet. Open the mouth, and draw the tongue forward. Keep the body in this posture for a few seconds, or a little longer if fluid escapes. The escape of fluid may be assisted by pressing once or twice upon the back.

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* We regret that our limited space totally precludes us from noticing Dr. Smith's laborious investigations on the effect of different kinds of food and drink on the excretion of carbonic acid. The reader will find them described in several of the back volumes of the *Philosophical Transactions.*

The other document to which we referred is entitled *Instructions for the Restoration of the apparently Dead from Drowning*, and was issued in 1864 by "The National Life-boat Institution." In these *Instructions* (a copy of which should be in the possession of every family), it is recommended, that if breathing cannot be excited by the application of stimulants to the nostrils, or by dashing water on the face, Marshall Hall's method should be tried; and that if this do not prove successful in from two to five minutes, Dr. Sylvester's method should be resorted to.

In conclusion, a reference must also be made to the *Reports of the Scientific Committee* [of the members of the royal medical and chirurgical society] *on the Uses and Effects of Chloroform*. The committee decide that the most certain means of restoring life after poisoning with anæsthetics is by artificial respiration. "By this means, resuscitating may generally be accomplished after natural respiration has ceased, provided the heart continue to act; and it may *sometimes* be effected even after the cessation of the heart's action. Galvanism resuscitates within the same limits as artificial respiration; it is, however, far less to be relied on in equal cases. Galvanism may be used in addition to artificial respiration; but the latter is on no account to be delayed or suspended, in order that galvanism may be tried."—*Proceedings of the Royal Medical and Chirurgical Society*, vol. iv. 1864.

RESPIRATOR is the name given by its inventor, Mr. Jeffreys, to an instrument which gives warmth to the air drawn into the lungs in breathing. It is attached to the mouth, and is composed of several layers of very fine wire, fixed so near together that the exhaled air passing through them is diffused over a very large amount of surface, its warmth being absorbed by the metal, which, being an excellent conductor of heat, freely returns it to the cold air, drawn in through it in the act of inspiration. Mr. Jeffreys considers it necessary that about 20 layers of metal-work should be used, and in order to make the instrument as light and compact as possible, each layer must be extremely thin. The apparatus usually consists of from 8 to 12 frames of sheet-silver or other metal, about 3½ in. long, 1¼ in. wide, and $\frac{1}{200}$th of an in. thick, the metal of which is pierced away by machinery so as to leave only a narrow framework, consisting of 6 vertical bars, $\frac{1}{30}$th of an in. wide, and 5 horizontal bars, with a width of $\frac{1}{30}$th of an in. thick. To each side of each of these frames is soldered a layer of wires 1¼ in. long, and $\frac{1}{450}$th of an in. thick. These wires are laid at about $\frac{1}{200}$th of an in. apart, and are so numerous that a large respirator of high power contains 2,000 ft. of wire, divided into about 12,000 pieces, and soldered to the frames at more than 80,000 points. The frames, of wire-work, are fixed parallel to each other, and kept a small distance apart by small knots of a bad conductor of heat, so that the inner layers is alway kept at almost the temperature of the expired air, and each successive layer diminishes in warmth, till the outer one is nearly as cold as the external air. By this arrangement, the air that is inhaled meeting with layers of wire of gradually increasing heat, is raised in the most powerful respirators to the highest attainable temperature. Such respirators have 24 layers of wire-work, those of medium power 16, and the weakest 8. The whole of the wire-work is curved, so as to fit closely to the face, and is inclosed in a border or case of soft leather; and an outer coat, usually of a very fine and open woolen fabric, is added. The form of instrument chiefly used is fixed over the mouth, and is named *the oral respirator*. For an instrument to cover both the mouth and nostrils, the term *ori-nasal respirator* is used. As defective and imperfect imitations of Mr. Jeffreys's respirator have been advertised, the original inventor has superadded the word *pneumoclime*, or "climate for the lungs," to all the respirators for which he holds himself responsible. The use of these instruments in allowing persons with delicate lungs to take out-of-door exercise with safety and advantage in comparatively severe weather, is now universally recognized by the medical profession.

RESPIR'ATORY SOUNDS are of the greatest importance in the diagnosis of the diseases of the lungs. They may be divided into (1) those directly resulting from inspiration and expiration, and (2) those of the voice, including coughing.

In the healthy state of the lungs, two distinct sounds are heard, on applying the ear, either directly or through the intervention of the stethoscope, to the walls of the chest—one called the *vesicular sound*, because it is supposed to be caused by the passage of the air from the ultimate tubes into the air-cells or vesicles; and the other the *bronchial sound*, because it is generated in the bronchial tubes by the air moving through them.

The vesicular sound, known also as the *respiratory murmur*, is mainly produced during inspiration, being very faint, and sometimes scarcely perceptible during expiration. It is rather a rustle than a murmur, and has been compared to the sighing of a gentle breeze among leaves, to the sound made in the deep inspiration of a sleeping person, etc.; but a single minute's application of the ear to the chest of a healthy person below the collar-bone, will give a clearer idea of its true nature than any mere description could convey. The sound is more distinct in thin than in fat persons, in women than in men, and in children than in adults. Indeed, it is so loud in children, that when an unusually noisy sound is heard in an adult, it is said to be *puerile*. The *bronchial sound* has a blowing character, such as may be produced by blowing air quickly through a tube, and is altogether distinct from the former. It may be most clearly heard over the trachea or windpipe, and at the upper part of the sternum or breast-bone.

Such are the sounds as they occur in the healthy lungs. In disease, any change which tends to impair the respiratory function in one part of the lungs, will make the vesicular murmur abnormally weak there, and abnormally loud in the remainder; and there are other changes, besides a mere increase or decrease of intensity, that sometimes occur, and into which we have no space to enter. The bronchial sound is also liable to morbid alteration; for example, it may be heard in parts of the chest where it is usually inaudible, in consequence of condensation of the surrounding pulmonary tissue, or from dilatation of the tubes, independently of condensation; and in violent dyspnœa, it may sometimes be heard over the whole chest without any change of structure. These morbid sounds are only modifications of those which occur in health. There are, however, other sounds generated by disease which are highly important in diagnosis. These are termed *râles* by the French, and *rattles*, *sibilus*, *rhonchus*, etc., by those English writers who do not adopt the French term. They may be briefly divided into the *dry* and the *moist râles*, the former being caused by the passage of the air, with increased rapidity, through narrowed portions of the bronchial tubes; while the latter are formed by the passage of air through a fluid of more or less tenacity in the bronchial tubes, causing the formation of a succession of bubbles, whose bursting occasions the sound.

There are two other morbid sounds connected with the respiratory system which deserve to be named in this list, viz., *metallic tinkling* and the *friction sound*. Metallic tinkling is a quick and sharp sound, resembling that produced by striking a glass vessel with a pin. Its occurrence affords evidence of the existence of a cavity of considerable size, containing air, and surrounded by firm walls; but how the sound is produced is not definitely settled. The friction sound is produced by the rubbing together of the pulmonary and costal pleuræ when rough from inflammatory action, and is indicative of pleurisy.

RESPOND, in Gothic architecture, a half-pier attached to a wall, and supporting an arch, etc.

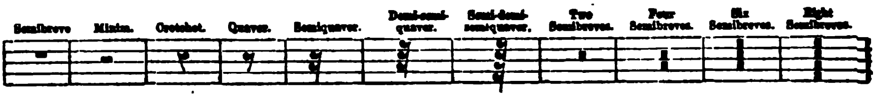
RESPONDENT is the name of the party against whom another party presents a petition to a court which requires to be answered. The word is used in Scotland as well as in England, but more frequently in England.

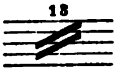
RESPONDENTIA is a mode of raising money by a master of a ship in critical and desperate circumstances, when he has no other means of doing so, and when the object is to rescue or save the ship and cargo for the benefit of all parties. He goes to a person who advances a sum of money, and takes a mortgage of the goods or cargo, but in such a way that if the goods never arrive, the creditor loses his whole security, and cannot claim repayment from the owner of the ship. When money is borrowed in a similar way on the security of the ship itself, it is called bottomry (q.v.). In both cases the security is in the form of a bond.

RESPONSORIES (Lat. *responsorium*. a response), short sentences, generally verses or portions of verses from scripture, which are assigned in the church services, to be answered by the people to the officiating clergyman. Responsories are appended to lessons, to chapters, and to versicles, in common with which they are either chanted or simply repeated, according to the nature of the service. They are found in all the ancient liturgies, and occur also in the book of common prayer. In the latter the name given to them is RESPONSE; but in the ancient service-books, as well as in the modern breviary, they are called as above.

REST, in heraldry, the name usually given to a charge, varying considerably in different representations. It appears at too early a date to be what it is often said to be—a spear-rest. It is sometimes called an organ-rest, and in old rolls, a clarion—and is most likely a representation of some musical instrument like the pandean pipe. It was a rebus-badge of the Clares.

REST, in music, an interval of silence occurring in the course of a movement between one sound and another. The duration of a rest, like the duration of a note, is indicated by the form of the character representing it.



For rests of a still longer duration, it is now usual to draw one or two oblique lines across the staff, and write on them in figures the number of measures during which the voice or instrument is to be silent. Thus,  in common time, denotes a rest of 13 semibreves. A rest, like a note, may be prolonged by one or more dots.

REST-HARROW, *Ononis*, a genus of plants of the natural order *leguminosæ*, suborder *papilionaceæ*, having a 5-cleft bell-shaped calyx, the standard of the corolla large and striated, the keel beaked, the pod turgid and few-seeded. There are many species, chiefly natives of Europe, and generally herbaceous or half-shrubby.—The COMMON REST-HARROW (*O. arvensis*) is abundant in pastures and by waysides in Britain. Its lower leaves have three leaflets, the upper are simple; the flowers are axillary and rose-colored, or occasionally white. The plant is half-shrubby, with somewhat spiny stems; viscid; and its smell strong and unpleasant. The roots are tough and woody, whence its English name. It is sometimes a troublesome weed, but only in neglected pastures, and disappears before careful cultivation.

RESTIA'CEÆ, a natural order of endogenous plants, nearly allied to *cyperaceæ*, mostly natives of the southern hemisphere, and abounding at the Cape of Good Hope and in Australia. They are herbaceous plants, or sometimes half-shrubby, have simple stems, and narrow leaves; and are hard, wiry, and rush-like. They have generally a creeping root-stock. The flowers are in heads or spikes, generally unisexual, with 2 to 6 glumes, sometimes with none, 2 or 3 stamens, an ovary with 1 to 3 cells, 1 ovule in each cell, the fruit a capsule or nut. *Restio tectorum* is much used for thatching houses at the Cape of Good Hope. *Wildenowia teres* is used for making baskets and brooms.

RESTIGOUCHÉ, a river in the n.w. of New Brunswick, Canada, forms for about 50 m. the boundary between that province and the province of Quebec. It is 200 m. in length, and falls into Chaleur bay, which opens into the gulf of St. Lawrence. For the last 18 m. it is navigable for the largest ships.

RESTIGOUCHE, a co. in n. New Brunswick, having the bay of Chaleurs and the Restigouche river on the s. and s.e., drained by the Matapediac and numerous small rivers emptying into the bay; 2,889 sq.m ; pop, '71, 5,575. The intercolonial railway skirts its n. border. Its surface is composed of mountains, covered with a dense growth of timber, and valleys which are fertile by the water courses, but very little cultivated. The exportation of lumber is the principal business, and it has a large trade in preserved salmon and lobsters. Co. seat, Dalhousie.

RESTITUTION, in Scotch law, is the obligation of the purchaser of a movable, which really belongs to a third party, to deliver it up to such real owner without claiming repayment of price. An action lies to recover restitution of money paid in mistake. See REPETITION.—In English law the word restitution is used in similar circumstances to denote delivery up of possession to the rightful owner. Thus, in case of goods stolen, the criminal court may order restitution of the goods to the owner.

RESTORATION, a term applied in English history to the resumption of monarchical government, on the accession of Charles II., May 29. 1660, after an interval of 11 years from Jan. 30, 1649, when Charles I. was beheaded, during which the government of Great Britain was republican. The restoration was appointed by various statutes to be observed as a festival in the church of England, with special religious services; but its observance was abolished in 1859 by act 22 Vict. c. 3.

RESTORATIONISTS, a sect which, under a new name, has revived a very ancient doctrine, which has found advocates at all times since the days of Origen (q.v.). One of the most remarkable doctrines of that father was his belief of a general *apokatastasis*, or "restoration" of all things, in which, after a purgation proportioned to the various moral conditions of their souls at the time of death, all men, however wicked, and all the evil angels, even Lucifer himself, would be restored to the favor of God, and reunited to him in heaven. This doctrine was condemned at the time, and has since been repeatedly rejected by the churches of the east as well as of the west. The doctrine has been renewed in more than one form since the reformation by various classes, who have taken the name of Universalists (q.v.). The particular title of Restorationists was given in America to the followers of a preacher named Ballow, who, in addition to the tenet above explained, held that all retribution is confined to this life, and who, although he denied the immortality of the soul, yet taught that at the resurrection all men will be admitted to everlasting happiness. The Restorationists are said to exist chiefly in Massachusetts.

RESURRECTION. This expression denotes the revival of the human body in a future state after it has been consigned to the grave. We find traces of this doctrine in other religions, and especially in later Judaism, but the doctrine is peculiarly Christian. In the earlier Hebrew Scriptures there is no mention of it. It is not to be found in the Pentateuch, in the Psalms, nor even in the earlier prophecies. It is supposed to be alluded to in Isaiah (xxvi. 19), and in Ezekiel (xxxvii.) in the well-known chapter as to the revival of dry bones in the valley of vision; and in the last chapter of Daniel (xii. 2) there is the distinct affirmation that "many that sleep in the dust of the earth shall awake, some to everlasting life, and some to shame and everlasting contempt." There is also a well-known passage in Job (xix. 25–27) which has been thought by some to refer to the doctrine of the resurrection of the body. Almost all recent criticism, however, denies the validity of this reference, as unsupported by a correct rendering of the words themselves; and especially by the whole scope of the argument of the book, which confines its view of retribution to the present life. The idea of a future resurrection would have presented to the mind of the patriarch a more conspicuous solution of the enigmas of Providence which perplexed him, and could not have failed to be introduced into the argument by some of the speakers, had it formed an element of their religious knowledge: but they nowhere allude to it. It is only, therefore, in the later Judaism that the doctrine appears. In the time of our Lord it had become a formal doctrine of the Pharisees. The general body of the Jewish people seem also to have believed in it. The Sadducees alone disputed it (Matt. xxii. 23, sq.; Luke xx. 27, sq.; Acts xxiii. 6–8). It appears, in fact, to have become bound up in the Jewish mind with the idea of a future life, so that an argument which proved the one proved the other; and the Sadducees not merely denied the distinctive idea of the resurrection, but further denied that there was any "angel or spirit."

It remained for Christ and his apostles to reveal clearly the doctrine of the resurrection of the body, and to connect it with the fact of Christ's own resurrection as its special evidence and pledge. The following may be stated as the main points involved in the doctrine as revealed in the New Testament: 1. The resurrection of the dead is ascribed to Christ himself; it will complete his work of redemption for the human race (John v. 21; 1 Cor. xv. 22, sq.; 1 Thess. iv. 14; Rev. i. 18). 2. All the dead will be raised indiscriminately to receive judgment according to their works, "they that have done good, unto the resurrection of life; and they that have done evil, unto the resurrection of damnation" (John v. 21–29; 1 Cor. xv. 22; Rev. xx. 11). 3. The resurrection will take place at the "last day," by which seems to be meant the close of the present world (John vi. 39, 40, xi. 24; 1 Thess. iv. 15). 4. The great event is represented as being ushered in by the sound of a trumpet, a representation probably borrowed from the Jewish practice of convening assemblies by sound of trumpet (1 Cor. xv. 52; 1 Thess. iv. 16). 5. As to the character of the change through which our bodies are raised after the lapse of ages, and get their identity preserved, there is nothing distinctly made known. The impossibility of such a change was evidently a subject of argument in the primitive Christian age, and the apostle argues strongly in its favor (1 Cor. xv. 32, sq.) from occurrences which are scarcely less mysterious in the natural world. It is not professed, however, that such occurrences really explain or throw light upon the fact of the resurrection. The apostle designs rather to silence cavils, and to invigorate faith, than to render an account of the actual manner of the resurrection. Arguing from God's infinite power as displayed in the processes of creation, he would, as it were, press the question which he asks elsewhere: "Why should it be thought a thing incredible with you that God should raise the dead?" (Acts xxvi. 8), rather than attempt any explanation of which the subject does not really admit. And this is the only becoming spirit in which this great doctrine can be contemplated by any mind. The fact of a resurrection of the dead is clearly revealed; but the *mode* of the fact necessarily transcends our present intelligence.

RESURRECTION (*ante*), in the signification of the word and the Scripture doctrine concerning it, implies that in some true sense the identity of the body will be preserved in the future life. As to what is necessary to constitute identity, various opinions are advanced. 1. The re-assembling of all particles that had ever been in the body. 2. The preservation of some, however few, from which divine power will construct a body adapted to the soul's higher condition. 3. The continued existence of a "vital germ." 4. The evolution of a "spiritual" body at the moment of death. 5. The existence of a formative principle of life which constantly gathers the matter which it needs for a body wherever it may be—this implies that the continuance of the vital principle constitutes identity, and that the principle of bodily organism, which now appropriates earthly materials, will at the resurrection have higher materials on which to act. 6. The entrance of the spirit into a new body to which it will impart the same personality as it had given to the old; personal identity, it is said, rests in the consciousness. There are several things taught in the Scriptures concerning the resurrection body of the righteous, the full meaning of which cannot yet be known. What is clearly revealed is that it will be: 1. different from the buried body, as the plant is different from the seed sown; 2. Spiritual, in distinction from the psychical bodies of earth; 3. Incorruptible, glorious, and powerful; 4. Like the glorified body of Christ in heaven. Concerning the resurrection body of the ungodly, Scripture is almost silent, saying scarcely anything more in relation to it than that the unjust also shall rise after death.

RETAINER is, in English law, the act of engaging an attorney or counsel to attend to a certain suit or case. The retainer of an attorney may be either verbal or in writing; but the retainer of a counsel is always by writing: i.e., by a written memorandum delivered by the attorney to the counsel. The retaining of a counsel is generally a precautionary measure resorted to only in the case of eminent counsel, the effect of it being to prevent the other party from securing the services of such counsel; and this is considered a prudent precaution in most cases of importance. The usual fee, however, must be paid over and above the retaining fee, which is a small fee varying with the court in which the litigation arises.

RETAINING WALLS. These, as their name implies, are walls built to retain earth, sand, or other incoherent substances in positions and forms which without their aid they could not maintain.

These substances, if left to themselves, will not stand with vertical sides, but will fall down till they assume a certain slope. The angle which this slope makes with the horizontal is called the "angle of repose." This angle varies according to the nature of the material; for example, that of moist soil is about 45°, while fine sand assumes an angle of about 30°.

In fig. 1, E represents a section of a mass of earth, which it is desired to retain by means of the wall ABCD.

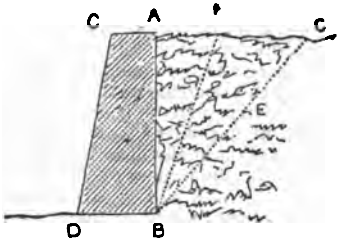


Fig. 1.

If we draw BG from B at the angle of repose, it is evident, from what has been said, that the prism ABG is kept in position by means of the retaining wall; and if the earth began to give way, it would do so by slipping on some line, BF. The wedge-shaped piece, ABF, which has the greatest tendency to separate itself from the rest of the mass, is called the "prism of greatest pressure;" and the retaining wall ABCD must be made of sufficient weight and thickness to prop it up and resist its tendency to slide. The line BF is found to bisect the angle ABG.

In estimating the requisite thickness of the wall, it must be taken into account that the wall may give way in various manners; it may be overturned, or it may slide as a whole along its base DB, or the upper parts may give way, while the base remains.

From these data, mathematical formulæ have been worked out, which determine the thickness requisite for different situations and materials, such as that given by M. Poncelet for ordinary materials, and within ordinary limits:

$$x = .285(H + h).$$

Where H, the height of the wall, and h, the additional height of the bank above the top of the wall, being given, x, the thickness of the wall, can be found.

These formulæ, however, are not of much practical value, on account of the varying nature of the data on which they are founded, and of the excess of strength requisite in all such constructions, to allow for causes of failure, which cannot be foreseen or provided for in the calculations. Practical experience is found to be the only safe guide in all such considerations.

Figs. 2, 3, and 4 represent sections of forms of retaining walls in common use. Figs. 2 and 3 are used in retaining earthworks, while fig. 4 is a common form of dock-wall.

In that shown by fig. 2, the thickness at the top is made from 2 to 3 ft.; the back is vertical, and the front is sloped out 1 ft. for every 8 ft. in height; so that the thickness increases with the height, in the same manner as the pressure of the earth, which it is required to resist.

The foundation is made of large stones, extending beyond the sides of the wall, so as to distribute the pressure on as large a surface as possible. It is also sunk for 2 or 3 ft. below the adjoining surface, so as to resist its tendency to slip on its base.

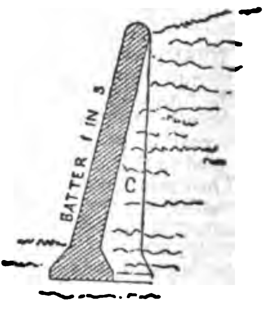


Fig. 2.

At its back are placed counterforts, C, which are built up with the wall, and are about 3 ft. long by 2½ ft. wide, placed from 8 to 10 ft. apart. These counterforts stiffen the wall like ribs: they put its center of gravity further back, and so resist the tendency to heeling or overturning; they also act advantageously in dividing the earth, and so diminishing the length of the mass, which can act together against the wall. This form of wall is very simple in construction.

The form of wall shown in fig. 3 is that which requires the least material; it also, on account of its thinness, dries and consolidates rapidly, but is not so easily built as that shown in fig. 2.

The dock-wall shown in fig. 4 is made much heavier than the simple pressure of the earth behind it would require; for it has many strains to bear of an exceptional character due to its situation; such are the machinery and goods deposited on the quays and the possible accident of the dock being suddenly emptied of water, while the earth behind the wall is full of water.

In the construction of a retaining wall, a great desideratum is, that the earth behind it be well drained; for if water be allowed to accumulate behind the wall, the earth gets into a semi-fluid state, in which it gives a very much increased pressure on the wall. For this purpose, holes are left through the wall called "weeping holes;" these holes are about 9 in. high and 2 in. wide, and are generally placed about 1 for every 36 sq. ft. of wall. Also stones without mortar are frequently built up behind the wall, so forming an open stratum, into which the water drains, and is thence carried off through the weeping-holes.

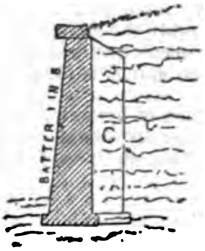


FIG. 3.

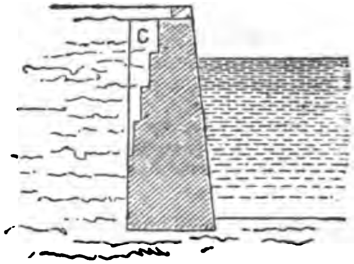


FIG. 4.

RETENTION OF URINE is the term employed in medicine to signify a want of power to discharge the urine from the bladder, and it must be carefully distinguished from a far more serious affection known as *suppression of urine*, in which also no urine is passed, because in this case there is none in the bladder.

Retention may arise either from change of structure of the parts concerned in the expulsion of the urine, or from mere disordered function unaccompanied by change. The former are termed *organic*, and the latter *functional* causes of retention.

Among the chief organic causes are: 1. Permanent stricture of the urethra (q.v.). 2. Contraction of the urethra, in consequence of a blow on the perinæum, or other external injury. 3. Tumors within the urethra. 4. Foreign bodies in the urethra, as calculi, clots of blood, or mucus, etc., which have entered it from the bladder, or fragments of bougies, etc., introduced from without. 5. Enlargement of the prostate gland, especially in aged men. The treatment in retention from these causes must be entirely left in the hands of the surgeon.

The principal functional causes are: 1. Spasm of the urethra, often termed spasmodic stricture; and 2. Want of power in the muscular coat of the bladder and urethra.

Spasm of the urethra is most likely to occur in those who have a slight permanent stricture, or a urethra irritable from other causes. The spasm usually follows exposure to cold and wet, but it may likewise be excited by piles or other sources of irritation in the lower bowel, or by the use of cantharides either taken internally as a medicine, or absorbed from blisters applied to the skin. The patient finds himself unable to pass his water, although he has a great desire and makes strong efforts to do so. The bladder soon becomes so distended that it can be felt as a tense round tumor above the pubes. If relief be not speedily afforded, the bladder may burst, and discharge its contents into the peritoneal cavity, in which case death rapidly ensues; or the urethra behind the stricture gives way, and the urine is extravasated into the cellular tissue of the adjacent parts—a condition which, if not promptly relieved by surgical interference, is likely to be followed by gangrene, typhoid symptoms, and death.

If the symptoms are not very severe, and there is no evidence of old permanent stricture, a hot bath, combined with the administration of the tincture of muriate of iron, in doses of ten minims, taken every ten minutes in thin gruel or in barley-water, will often give relief. Sometimes a full opiate administered by the mouth, or preferably as an enema, or the inhalation of a few whiffs of chloroform, will, by allaying the spasmodic action, give immediate relief. If these means fail, surgical assistance must be at once procured, and the bladder evacuated by a catheter—an operation often requiring very delicate manipulation. If these means fail, which only happens when the spasm is associated with old-standing disease of the urethra, the surgeon must either puncture the bladder through the rectum, or above the pubes, or make an incision into the urethra either at or behind the seat of the stricture.

Paralysis of the muscular coat of the bladder may arise from the debility of old age, from the depressed state of the nervous system in fevers of the typhoid type, from injury or disease of the head or spine, and from various other causes. In a temporary form, it is often a result of over-distention of the bladder from stricture or prostatic disease, and it sometimes occurs in the case of nervous sedentary persons, if they have allowed rather more than the usual time to elapse without evacuating the bladder. It should be generally known that retention of urine from paralysis is sometimes accompanied with dribbling away of the water, so that the retention might at first sight be mistaken for *incontinence* of urine. On examination, however, it will be found that the bladder is abnormally distended, and cannot be evacuated by the act and will of the patient.

In these cases, the urine must for a time be regularly drawn away by the catheter. General tonics, such as the cold-bath (or sometimes preferably the sitz-bath) and chalybeates, must be given to improve the general health; while medicines which are supposed to act locally on the mucous coat of the bladder or on the spinal cord, must be simultaneously administered.

A peculiar form of retention sometimes occurs in women of hysterical temperament, in which the will rather than the power is at fault. The treatment should here be directed toward the general hysterical tendency, rather than to this special manifestation of it.

RETFORD, EAST a small municipal and parliamentary borough and market t. in the county of Notts, on the right bank of the Idle, an affluent of the Trent, 138 m. n.n.w. of London by the Great Northern railway. West Retford, on the other side of the river, and connected with East Retford by a strong bridge of five arches, is a more modern and much smaller town. Tanning and coach-making are carried on to some extent. Pop. of municipal borough '71, 3,194; of parliamentary borough, which returns two members to parliament, and which includes several parishes and districts, 49,257.

RETHEL, a t. of France, in the department of Ardennes, prettily situated on the right bank of the Aisne. Woolen and other manufactures are carried on. Pop. '76, 7,364.

RE'THEL, ALFRED, 1816–59; b. at Aix-la-Chapelle, France; studied art at Frankfort and Düsseldorf. After his return from study in Italy, in 1845, he painted for the city hall of Aix-la-Chapelle, four frescos of great size, illustrating the history of Charlemagne. He produced a few other works of merit, such as the "Dance of Death" and "Hannibal Crossing the Alps;" but in 1852 became insane.

RETI'MO, a sea-port t. of the island of Crete, on its n. coast, 35 m. w. from Candia. The neighborhood is productive both of oil and wine. Pop. about 6,000, of whom two-thirds are Turks, and the rest Greeks.

RETINA. See EYE.

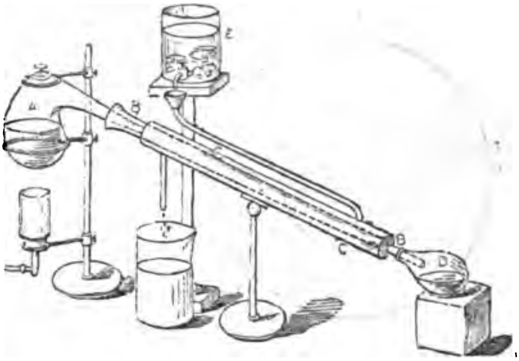
RETIREMENT, ARMY AND NAVY. A royal warrant introducing and regulating compulsory retirement from the army was issued in 1877. Voluntary retirement on half-pay is allowed to officers after not less than 12 years' service. Officers below the rank of maj., who have served in their present rank for seven years without promotion, are to be placed on half-pay after a total service of 20 years; majors after 27 years, and higher officers afrer varying periods. As to age, a col. who has not retired on other grounds, must, unless special exception be made, retire at the age of 63 years, lieut.col. at 60 years, maj. at 58 years, and officers of lower rank at 55 years—the pension varying according to circumstances. In the navy, officers are placed on the retired list at 65 years of age if admirals or vice-admirals, 60 for rear-admirals, 55 for captains, 50 for commanders, and 45 for lieutenants. with the option in each case of retiring 5 years earlier. Lieutenants and commanders are also retired compulsorily if they have not served for 5 years, captains after seven years, without service, and flag-officers after 10 years. In 1878 there were 2,110 naval and 218 marine officers on the retired list, costing £618,095. In the army there were 370 officers on retired full-pay, costing £132,000, and 1578 on half-pay, costing £280,000; but these numbers include nearly all staff-officers, and many on temporary half-pay on account of sickness, private affairs, etc. See PENSIONS, DISCHARGE; also SUPERANNUATION.

RETORT, a vessel employed by chemists for the purpose of distilling or effecting decomposition by the aid of heat. It may be made of glass, earthenware, or metal, according to the purposes for which it is to be employed.

Glass retorts are the most common, and their ordinary form is seen in the figure. They may be employed for the production of such products as do not require any extraordinary degree of cold for the condensation of their vapor—as, for instance, for the production of hydrocyanic or nitric acid. The globular vessel in which the neck of the retort is inserted is from its function termed the *receiver*. Cold may be applied to the neck of the retort—for the purpose of condensing the vapor—in various ways, as by the application of a cold wet cloth, by a current of water, or by a special apparatus known as *Liebig's condenser*.

In the accompanying figure a *Liebig condenser* is fitted on to the retort. A is the bulb of the retort, into which the matter to be distilled is inserted. It can be opened or closed at will at the top by a ground-glass stopper. From the bulb the neck proceeds, and its termination is seen in the receiver, D. The condenser, BB, embraces the greater part of the neck of the retort. It consists of a glass tube, tapering from end to end, fixed in the center of a metal pipe, provided with tubes, so arranged that a current of cold water may circulate through the apparatus. By putting a few pieces of ice into the little cistern, E, the temperature of this water may be kept at 32°, and extremely volatile liquids condensed.

The retort may be heated in various ways—as by means of a lamp, or by placing its body in a sand-bath, or even in the fire; in the last case, the retort is usually protected by a coating of lute.



Liebig's Condenser.

In ordinary cases requiring a higher temperature than glass could bear, earthen retorts are used; for the preparation of hydrofluoric acid, retorts of lead are employed; while for the preparation of strong sulphuric acid, platinum is the best material for the retort. Iron retorts are employed in the laboratory for the preparation of oxygen from black oxide of manganese and some other processes; and in gas-works, for the destructive distillation of coal.

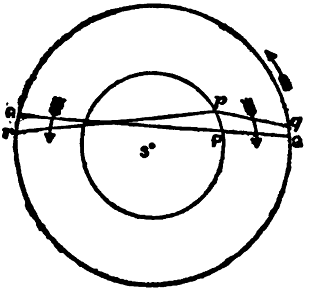
RETREAT, in military language, signifies a retrograde movement of a force, with the intention of avoiding an encounter with a hostile body in the front. The greatest exertion of talent is requisite in a gen. to conduct an able retreat, more depending on arrangement and coolness than even in the preliminaries of a battle. When the enemy pursue, if the retreat is not to degenerate into a rout, the retreating army must be covered by a powerful rear-guard, which from time to time must hold the pursuers at bay, while the artillery-train and baggage pass defiles, cross streams, and overcome other special obstacles. A strong retreat is made when the rear is formed by a line of solid battalions, of which alternate masses retreat, while those intervening face about and oppose the enemy; the latter afterward retreating between and to the rear of those which retreated in the first instance. The retreat is thus continued by alternate halting and falling back on the part of each corps.

RETRENCHMENT, in fortification, is a defensive work, comprising at least ditch and parapet within some other work of a fortress, and intended as a place of retreat for the defenders, whence they may prolong the defense, or capitulate after the faces of the work itself have fallen into the enemy's hands. The retrenchment bears a considerable resemblance to the *réduit* except that it is almost always of earth. Retrenchments are made in ravelins, and the re-entering *places d'armes* at the time of constructing those works. A retrenchment is thrown across the gorge of a redan or bastion, or from shoulder to shoulder, when it is apprehended that the salient angle will fall into the possession of the besiegers; these retrenchments are usually made when wanted. Such a retrenchment across the interior of the Redan at Sebastopol caused the sanguinary repulse of the British on Sept. 8, 1855.

RETRIEVER, a dog specially trained to go in quest of game which a sportsman has shot, and particularly useful in fatiguing ground or in marshy places. The retriever is generally cross-bred, the two recognized crosses being that between the Newfoundland and setter, which has the coat smooth and wavy, and that between the Newfoundland and water-spaniel, which has the coat curly. The favorite color is black. Spaniels, crosses of the terrier and spaniel, and terriers are also used as retrievers; and even fox-hounds, blood-hounds, and setters. The training requires much assiduity and patience, the dog being apt at first to be drawn from the proper quest by any water-rat or other creature that presents itself, and also to bite the game too hard, so as to injure it. A thoroughly trained retriever therefore commands a high price, being of great use to the sportsman. A high degree of intelligence is requisite in a retriever; it is very often the attached companion of its master, and an inmate of the mansion rather than of the kennel.

RE'TROGRADE. This is a term applied to the motion of the planets and comets among the fixed stars when they appear to move in the *reverse* order of the signs of the zodiac (q.v.). All the planets move in the same direction round the sun, and therefore their retrograde motions must be due to their motion relative to the earth. In the case of comets, however, we have instances of motion about the sun in the opposite direction to that of the planets, and in such orbits the motion (referred now to the sun, not to the earth) is said to be retrograde.

In the case of the planets, which is thus the only one we need consider, let S be the sun, and let the two circles represent the orbits of two planets. First, let the planets be, as at P and Q, toward the same side of the sun. The inferior planet has of course the greater velocity; and therefore, if p and q represent their positions after the lapse of a given time (second, hour, day, etc), Pp is is greater than Qq, and therefore the *direction* of the line pq (in which one is seen from the other) has rotated in the *opposite* direction to that in which either planet revolves about the sun. Hence, when a superior planet is in opposition (i.e., if Q be Jupiter, and P the earth), it *appears* to move backward among the stars. When an inferior planet is between the earth and sun (i.e., if Q be the earth, and P Venus), it *appears* to move backward also. If the planets be on opposite sides of the sun, as at P and R in the figure, let p and r be their positions after a given time; then pr has turned from the direction PR in the direction in which the planets revolve about the sun. Hence any planet, superior or inferior, appears to move *directly* when the sun is between it and the earth. Between these two opposite cases, there must, of course, be points at which the apparent motion is neither retrograde nor direct—then the planet is said to be *stationary*. This case occurs whenever, for an instant, the lines PQ and pq are parallel: that is, when the two planets are moving with equal velocities transverse to the line joining them, these velocities being parallel, and toward the same side of the joining line.



RETZ, **Gilles de Laval**, Seigneur de, 1396–1440; was prominent in the wars with the English. He was condemned and put to death for magic and various horrible crimes; being found guilty of enticing into his castle several hundred children, whom he forced to worship the devil.

RETZ, **Jean François Paul de Gondi**, Cardinal de, 1614–79; b. Montmirail, France, of a rich and noble family. By his father he was compelled to enter the church, with the intention that he should become archbishop of Paris, a position which had already been held by two members of his house. In his studies he displayed great brilliancy and penetration, but his private life was dissolute. He became connected with the comte de Soissons, and engaged to some extent in political intrigue; but, after the death of that nobleman, resumed his theological studies and was made coadjutor of the archbishop of Paris, his uncle, by Louis XIII. on his death-bed. He devoted himself to his duties with zeal, and gained great popularity by his profuse distribution of alms. On the breaking out of the faction of the Fronde (q.v.) he at first was of great assistance to the royal cause, but was distrusted by the court, and became at last the leader of the popular party, though he did not openly declare himself as such. Though ambitious, it was admitted that he acted in these troubles with dignity and moderation. In 1650 he was gained over by Mazarin and rewarded with a cardinal's hat. After the close of the war and the return of the court to Paris, in 1652, a mission to Rome was offered to Gondi if he would leave his see; he was still greatly distrusted by the royalists; and as he hesitated was arrested and imprisoned at Vincennes. He resigned his archbishopric, which he had attained on his uncle's death, and was allowed to retire to Nantes, whence he made his escape into Spain and repaired to Rome. Here he revoked his resignation and succeeded in bartering the archbishopric for profitable benefices. After some years of exile he became reconciled to Louis XIV. and returned to France, but abstained altogether from further political intrigue. He sold his estates, paid his debts, which were enormous, and devoted the rest of his life to works of charity and religion. His *Memoirs* are described by Voltaire as displaying an air of grandeur, an impetuosity and inequality of genius, which are the picture of his conduct.

RETZSCH, **Friedrich August Moritz**, an eminent German painter and engraver, was b. in Dresden, Dec. 9, 1779, studied at the academy of his native city, where he became a professor in 1824. Retzsch died July 11, 1857. He has acquired great celebrity by his illustrations in outline of the great German poets, Schiller, Goethe, etc.—those of Goethe's *Faust* being particularly well known, not only in his own country, but also in France and England. His illustrations of Fouqué's charming romances, *Undine* and *Sintram*, are singularly beautiful. Retzsch likewise executed several fine works, the subjects of which are taken from the classical mythology, as "The Child Bacchus asleep on a Panther," "Diana," "Love and Psyche embracing in the Clouds," "A Satyr and Nymph," "The Four Epochs of Human Life," etc. Among his other works of conspicuous merit are: "The Struggle of Light and Darkness," "The Chess Players," and "Fantasies." Retzsch ranks as one of the most original, thoughtful, and vigorous artists of modern Germany. His works display the presence of a strong, inventive, and cultured imagination, whose efforts at expression never degenerated into a weak sentimentalism. As a miniature oil-painter Retzsch was also very successful.

REUCHLIN, **Johann**, also known by his Græcized name of *Capnio*, one of the first and most active promoters of Hebrew studies in Germany, whose labors and struggles in no small degree helped to bring about the reformation, was born at Pforzheim in Baden, Dec. 28, 1455. He received his earliest education at Schlettstadt, and in 1473 was appointed traveling companion to prince Friedrich of Baden, in which capacity he visited Paris, made the acquaintance of the celebrated Wessel (q.v.), and studied Greek under Hermonymus of Sparta, besides assiduously practicing the composition of Latin. Two years later Reuchlin went to Basel, where he continued his study of Greek, and wrote his Latin dictionary, *Vocabularius Latinus Breviloquus Dictus* (Basel, 1478). In the same year he paid a second visit to France, studied law at Orleans (1479), and fought at Poitiers (1480), then returned to Germany, married, and set up at Tübingen as a teacher of jurisprudence and literature. Subsequently he was raised to the rank of a count of the German empire in 1492, and about the same time began the study of Hebrew under a learned Jew, Jacob Jehiel Loans, the imperial physician. In 1496 Reuchlin went to Heidelberg, where he wrote a satirical comedy entitled *Sergius, sine Capitis Caput*, directed against the unworthy Augustinian monk Holzinger, who had been made chancellor of Würtemberg. In 1498 he was sent to Rome by Philip, the elector-palatine, and delivered a Latin oration before the pope. While remaining there he applied himself more vigorously than ever to the study of Hebrew and Greek, and with such success that his Greek master, Argyropulus, exclaimed in wonderment at his proficiency: "Our persecuted Greece has taken refuge beyond the Alps." Reuchlin returned to Würtemberg in 1499. In 1506 appeared his *Rudimenta Linguæ Hebraicæ*, a work of which he was justly proud. He made it, as he said in his preface, "without any foreign help," declares it to be "the first attempt to execute a grammar of the Hebrew tongue," and finishes with the Horatian boast, *Exegi monumentum ære perennius*. His Hebraic studies, which embraced the post-biblical Jewish literature, were—in their consequences—the most important of his life, drawing him into bitter strife with learned Jews, Jewish proselytes, and the Dominicans, and directly and powerfully helping on the reformation. It was in the year 1510 that the struggle between light and darkness, as the Germans regard it, broke out. In that year Johann Pfefferkorn, a Jewish proselyte, in the true spirit of a renegade, called upon princes and subjects to persecute the religion of his fathers, and especially urged the emperor to burn or confiscate all Jewish books except the Bible. Reuchlin remonstrated, maintaining that no Jewish books should be destroyed except those directly written against Christianity. This tolerant attitude drew upon Reuchlin the enmity of the Dominicans, and particularly the inquisitor, Jakob van Hoogstraten. These enemies of Reuchlin held possession of the universities of Paris, Louvain, Erfurt, and Mainz; but all the distinguished and independent thinkers in Germany, were on the side of the brave and humane scholar. Among the *Reuchlinists*, as they were termed, we may especially mention the names of Ulrich von Hutten (q.v.) and Franz von Sickingen (q.v.), to the first of whom (in conjuction with Rubeanus, etc.) we owe the *Epistolæ Obscurorum Virorum* (q.v.), and to the second of whom Reuchlin owed his safety, for he threatened (1519) Hoogstraten and his monks with his most terrible vengeance if they did not cease to persecute "his teacher, Doctor Reuchlin, that wise, experienced, pious, and ingenious man." When the reformation was inaugurated by the burning of the papal bull (1517), Reuchlin instinctively felt that a crisis had come, and exulted in the heroism of Luther. "God be praised!" he said; "we have now got a man who will give them [the monks] mighty hard work." Luther, in a letter to Reuchlin (1518), tells the latter that he had longed to take part with him in his noble struggle, but had never found an opportunity. But the end of the scholar's troubles was not yet come. A quarrel broke out between Ulrich duke of Würtemberg and the Swabian league, in the course of which Reuchlin become a prisoner of duke Wilhelm of Bavaria, who, however, generously restored him his freedom, and in 1520 appointed him professor at the university of Ingolstadt. While here he received a call to Würtemberg, which he declined, but sent Philip Melanchthon in his stead. In 1522 the plague broke out in Ingolstadt, and Reuchlin again withdrew to Tübingen, intending to devote himself exclusively to learned studies, but soon after he fell sick, and died at Stuttgart on June 30. Reuchlin's life has been written by Gehres (1815), Meyerhoff (Berl. 1830), and Geiger (Leips. 1871).

RÉUNION, ILE DE LA, one of the names which has been borne by the island described under the head of BOURBON, ILE DE. This last name it had borne till the French revolution, when it was called *Réunion;* in 1809 it received the name of *Ile de Bonaparte;* after the treaty of Paris (1814) it reassumed the name of *Ile de Bourbon*, and retained it till 1848, when it again took the name of *Réunion*, and by that name it still continues to be officially known.

REUS, a lively modern manufacturing t. of Spain, in the modern province of Tarragona, and 10 m. w. of the city of that name by railway. It is only about 5 m. from the seaport of Salou, with which it is connected by a canal. The older portion of Reus was founded as early as 1151, and consists for the most part of tortuous lanes; the modern portion consists of wide plazas and streets. The *mercado*, a sort of arcaded exchange, surrounded with shops, is the principal square. The prosperity of Reus dates from about the year 1750, when a number of English merchants settled there, and developed the resources of the district. A number of the inhabitants are engaged in agriculture, but the majority are employed in the manufacture of silk and cotton fabrics, soap, earthenware, casks, leather, machinery, and in the general trade of the town. Reus contains

80 establishments for cotton-spinning alone, 5,000 looms, and many silk-ribbon factories. It imports flour, sheep and cattle, timber and hides, and exports brandy, wines, nuts, almonds, oil, leather, etc. Pop. 24,500.

REUSS, the name of two sovereign principalities of Germany, between the kingdom of Saxony and the Prussian duchy of that name, and separated from each other by the circle of Neustadt, an outlying portion of the grand-duchy of Saxe-Weimar. Since the year 1616 the possessions of the house of Reuss have been divided between the elder and the younger lines. According to the *Almanach de Gotha* for 1878, the principality of Reuss-Greiz (the elder line) is 123 sq.m. in extent, and had, in 1875, 46,985 inhabitants. The chief town and seat of the government is Greiz (q.v.). The principality of the younger line is Reuss-Schleiz, area 320 sq.m.; pop. '75, 92,375. Capital, Schleiz (q.v.). Of both principalities the surface is hilly, being traversed by the Frankenwald, whose chief summits are upward of 2,000 ft. in height. The chief rivers are the Saale and the Elster, the valleys of which are extensive and well cultivated. Large tracts are covered with forests and in pasture, and cattle and timber are exported. By the constitution of 1867 Reuss-Greiz obtained some much-needed reforms. Patrimonial jurisdiction was abolished, the administration of justice put under the management of regular courts, and a form of representative government granted to the people (7 of the 12 members of the single chamber being elected by town and country). The existing constitutional form of government in Reuss-Schleiz dates from 1852; 12 of the 16 representatives are elected by the people. The population in both states is almost wholly Protestant, and is industrially prosperous.

REUT'LINGEN, a t. of Würtemberg, situated in a beautiful district, fertile in fruit and wine, on the Echatz, a feeder of the Neckar, 20 m. s. of Stuttgart. Its houses are old and picturesque; and it was formerly surrounded by walls and moats, the site of which, however, is now occupied by streets. The church of St. Mary, completed in 1345, and surmounted by a pierced tower 325 ft. high, which is considered the most beautiful in the kingdom, is a noble Gothic edifice. Woolen and cotton yarns are spun, and cloth, leather, cutlery, hosiery, etc., are manufactured. Pop. '75, 15,246.

REVALENTA ARABICA, a name given to a preparation which has long been sold as an empirical diet for invalids, extraordinary restorative virtues being attributed to it. It is, in reality, only a preparation of the common lentil, its first name being formed for disguise by the transposition of its botanical name, *ervum lens.* Its real value is about equal to good pea-meal, the constituents of 100 parts of each being as follows: *Lentil meal,* or *revalenta*—Water, 12.70; nitrogenous matter, 24.57; starch, 59.43; fatty matter, 1.01; inorganic matter, 2.29. *Pea-meal*—Water, 12.50; nitrogenous matter, 25.80; starch, 58.38; fatty matter, 1.20; inorganic matter, 2.52.

REVEAL, REVEL, the square ingoing of the sides and lintel, or arch, of doors and windows between the face of the wall and the framing.

RÉVEILLAUD, EUGENE, b. France, about 1850; of Roman Catholic parentage; was devoted by his mother to the priesthood, but being averse to the vocation was permitted to enter the national schools and study law. As an undergraduate he gained the highest prize, and in the law school attained great honor. Having been received as a barrister he engaged in a brilliant course of journalism in connection with the provincial papers, and became absorbed in the discussion of the great public questions of the day. Among these he soon saw that the religious question is the one of paramount importance to France. "Religion man must have; philosophy, masonry, free-thinking, will not take its place. But where shall the proper religion be found?" The religion of Rome, in his judgment, was not that which France needs. And as he studied the subject, although not himself a Protestant, he became convinced that Protestantism was the element of national life for the lack of which the French revolution had proved a failure. France therefore must, he was persuaded, embrace the reformed doctrines if only from motives of self-preservation. In the book which he wrote advocating the change, he said: "The author is not a believer. Born and brought up in Catholicism, he is what people call a free-thinker. His book is not a work of religious propagandism, but an attempt at social preservation." Since that time, however, he has become a Christian believer; and, withdrawing himself in a great degree from other employments, devotes his time and talents to the work of spreading through France what he regards as the truth. Already he has traversed many parts of the country lecturing in theaters and public halls to immense throngs of eager listeners. In 1880 he visited the United States, presenting his cause and exciting great interest.

REVEILLE, in an army, is the beat of drums at break of day, to warn the troops that the night is passed, and the sentries to forbear from challenging.

RE'VEL, or REVAL, a Russian seaport and fortress of the first rank, capital of Esthonia, one of the Baltic provinces, stands on a small bay of the same name, 238 m. w.s.w. of St. Petersburg. It is divided into the upper and lower towns. The former, occupying the top of a rocky ridge about a mile in circumference, is inclosed by old Gothic walls, and contains the cathedral, the castle, gymnasium, governor's residence, and the houses of the nobility. This quarter, generally called the Dom, is connected by a steep descent with the lower town, which extends to the sandy shore of the harbor. The existing walls and fortifications were erected in 1860. It was long held by the Lithuanian order of knights; was made over to Sweden in 1562; bombarded by the Danish and Lübeck fleets in 1569; and besieged by Peter the great, and annexed to the Russian empire in 1710. In 1713 a naval harbor, in addition to the commercial harbor already existing, was founded. The commercial importance of the town is at present small. The chief articles of export are flax, linseed, rye, skins, corn, and potato-brandy, supplied by land from the governments of Esthonia, Pskov, and Livonia. The chief imports are salt, fruits, wine, and manufactured and colonial goods. Pop. '67, 27,325.

REVELATION is a familiar theological expression, commonly applied to the knowledge of himself which God has given us in holy Scripture. In itself, however, the word is properly, and of late years has been frequently used, not merely of the divine knowledge communicated to us in Scripture, but of all divine knowledge communicated through whatever source. Conscience and reason are in themselves modes of revelation, in so far as they witness to us of the divine laws which bind our moral life, and in harmony with which the health and happiness of that life can alone be found. History is also a species of revelation, unfolding, as it does, the same divine laws collectively in the race. Then nature reveals the divine power, wisdom, and goodness; and science, the interpreter of nature, in so far as it makes known the great laws governing the material universe, truly makes known the divine will to us. But it is with the Scriptures of the Old and New Testament that the idea of revelation has come to be especially associated. The holy Scriptures are undoubtedly in a special sense the medium of divine revelation to the human race. God has made known to us therein more fully and clearly than elsewhere his will and character. But at the same time we must not confound revelation, in its fact and essence, with the books of Scripture. These books are only the highest or most distinguished form or *medium* of revelation, which, in itself, and essentially, must always imply communication from one mind to another; and, in a religious sense, from the divine to the human mind. Scripture is, in its several books, the pre-eminent medium of this contact or interchange of the divine and human. It is the record of special communications which God made in time past to holy men, "who spake as they were moved by the holy Spirit." It *contains*, in short, a revelation for us: but the revelation is not the record, but the knowledge which the record conveys to our minds.

REVELATION OF ST. JOHN (*Apokálypsis Iōannou*), the last book of the New Testament Scriptures. It professes to be the production of St. John, traditionally known as "the Divine" (*ho theológos*). It has been a subject of dispute, however, whether St. John, the author of this book, is the beloved apostle, the author of the fourth gospel and of the three epistles, or not. Upon the whole, the balance of evidence and of authority seem to be in favor of the supposition that he is the same, although some distinguished names—Luther in the past, and Lücke among modern critics—have adopted the negative view of the question. The author's simple mention of himself by his name John; his description of himself as one "who bare record of the word of God, and of the testimony of Jesus Christ, and of all things that he saw," is held to indicate strongly an identity with the author of the gospel, who speaks of himself in similar language (John xix. 35). He writes from Patmos, and the apostle is the only John distinctly named in the early Christian history as an exile in Patmos. The authority, moreover, with which the writer addresses the seven churches in Asia is such as may be supposed only to suit an apostle. So far as historical testimony is concerned, the authority of the early Christian fathers—e.g., Justin Martyr, Theophilus of Antioch, and Irenæus, and Clement of Alexandria—all point to the apostle John as the author of the Book of Revelation. The date of the book is supposed to be the very close of the 1st c., 95–97 A.D., or the end of the reign of Domitian. We cannot here particularize the contents of the book, nor can we enter into any detailed statement of the different interpretations which have been given of it. It has been the subject of very varied and conflicting commentary. It has been stated that "not less than 80 systematic commentaries are worthy of note, and that the less valuable writings on the subject are unnumbered, if not innumerable." All that we can do here is to characterize the different schools, so to speak, into which the interpreters of this wonderful book may be arranged: 1. The Præterist school of interpreters, who look upon the Revelation as fulfilled in the past, and especially in the great conflicts of Christianity with Judaism and Paganism, and its triumph over them in the ages following the time in which it was written. To this class of interpreters belong, among others, Grotius, Hammond, Bossuet, Calmet, Eichhorn, Ewald, Lücke, De Wette, Stuart, Lee, Maurice. 2. The *Futurist* school regard the book, with the exception of the first three chapters, as referring to events yet to come to pass; and this view has been advocated, in modern times, by such writers as Dr. J. H. Todd, Dr. S. R. Maitland, Newton, and others. 3. What has been called the historical and continuous school of expositors, who regard the Revelation as a progressive symbolic history of the fortunes of the church from the 1st c. to the end of time. To this school of interpreters belong a host of eminent names, such as Mede, sir I. Newton, Vitringa, Bengel, Faber, Elliot, Wordsworth, Alford, Hengstenberg, Ebrard, and others.

There are others, again, who are not disposed to allow any exact prophetical character to the book, but simply to regard it as a species of symbolical poem, setting forth the eternally-recurring principles of the divine government. The real fulfillment of the

Revelation, therefore, is not to be sought in any definite historical events, but in the vindication of these principles shadowed forth more or less in great historical crises, yet transcending all partial historical results. The grand symbolic imagery of the book has never found and will never find its exact counterpart in any earthly facts, but it finds its spiritual counterpart constantly in the career of the church—the unceasing conflict of truth with error, of righteousness with sin, of life with death, of the kingdom of God with the kingdom of evil, and will attain to its true realization only on the destined triumph of the former over the latter.

REVELATION OF ST. JOHN (*ante*), contains, I., an announcement of its symbolic character, and a benediction on those who heed its words; John's salutation to the seven churches of Asia; an account of his vision of Christ in glory, with the command to record what he saw; II. messages to the seven churches; III. visions of the glory of God in heaven; the book with seven seals; the lamb, as it had been slain, who alone was found worthy to open the mysterious books, and the adoration rendered to him. IV. Visions at the opening of the seals: (1) a conqueror on a white horse; (2) a warrior on a red horse; (3) a tax collector on a black horse; (4) death on a pale horse; (5) the martyrs in white robes; (6) destruction amid the hosts of heaven, and terror among the inhabitants of earth; four angels holding the four winds; the sealing angel, and the 144,000 sealed on their foreheads; the multitude who came out of great tribulation; (7) silence in heaven; seven angels with trumpets, and one with a golden censer; the 1st trumpet, followed by hail, fire, and blood; the 2d by a burning mountain cast into the sea; the 3d by a star falling on rivers and fountains; the 4th by the smiting of the sun, moon, and stars; the 5th by the locusts from the bottomless pit; the 6th by millions of horsemen from the river Euphrates; the mighty angel, and the little book opened; seven thunders uttered, but not written; the angel on the sea and land, the little book eaten; the temple measured; the two witnesses; the 7th trumpet, followed by triumph in heaven. V. Vision of a woman clothed with the sun, crowned with 12 stars, and having the moon under her feet; the red dragon waiting to devour her child; the child caught up to the throne of God, and the woman fleeing to the wilderness; war between Michael and the dragon. VI. Visions (1) of a wild beast rising out of the sea, holding the dragon's power and seat, with great authority; (2) another wild beast rising out of the earth, exercising all the power of the first that was before his eyes. VII. (1) The lamb on mount Zion, with the 144,000 sealed ones, the harps, and the new song; (2) a flying angel proclaiming the gospel and the judgment of God; (3) another angel crying "Babylon is fallen:" (4) a third denouncing judgment on those who worship the beast; (5) a voice from heaven pronouncing benediction on those who die in the Lord; (6) the Son of Man on a white cloud, with a crown of gold on his head, and a sharp sickle in his hand with which he reaped the harvest of the earth; (7) An angel with another sickle to gather the vine of the earth and cast it into the winepress. VIII. (1) The sea of glass, mingled with fire; (2) the seven angels with golden vials containing the last plagues; the 1st vial poured out on the earth; the 2d, on the sea; the 3d, on the rivers and fountains; the 4th, on the sun; the 5th, on the seat of the beast; the 6th, on the river Euphrates, and the 7th, into the air. IX. A woman, arrayed in purple and scarlet, and adorned with gold, precious stones, and pearls, having her name and character of abomination written on her forehead sitting on a scarlet colored beast, and drunk with the blood of saints and martyrs; the mystery explained and judgments on the woman and beast foretold. X. A great angel coming down from heaven, clothed with mighty power lighting up the earth with his glory, and proclaiming the fall of Babylon; (2) its destruction described, attended with lamentation on earth, and with joy in heaven. XI. (1) The marriage of the Lamb; (2) again a conqueror on a white horse, with his kingly name on his vesture. XII (1) Satan bound and shut up in the bottomless pit for a thousand years; (2) the souls of martyrs living and reigning with Christ during this millennium; this explained as the "first resurrection" which saves from the "second death;" (3) Satan loosed out of his prison and going forth to deceive the nations, and gather them together to battle; (4) their defeat, and Satan's doom; (5) the final judgment. XIII. (1) The new heaven and new earth; (2) the bride, the heavenly Jerusalem; (3) the river and tree of life. XIV. The conclusion, containing the renewed testimony of Jesus; a summing up of gospel invitations; a warning against altering the prophecy; the Savior's promise, with John's response; and a gracious benediction from Christ pronounced on all.

The recounting of this series of sublime visions in which are mingled the earthly, the celestial, and the infernal powers, shows the vast mystery with which any interpretation of this book must deal.

REVELS, MASTER OF THE, or LORD OF MISRULE, the name of an officer, who, in England, was attached to royal and other distinguished houses, whose function it was to preside over the amusements of the court, or of the nobleman to whose house he was attached, during the 12 Christmas holidays. This officer, sometimes called *master of the tents and revels*, became a permanent appendage to the English court in the reign of Henry VIII., and his duties included the keeping the tents and pavilions which accompanied the sovereign on a royal progress, as also the keeping the dresses and masks used in entertainments given at court, and the providing of new ones when required. In queen Elizabeth's time, we find the mastership of the revels divided into several distinct offices. The office continued to exist till the reign of George III., when it was altogether discontinued.

REV'ENUE, PUBLIC. A state has a right to reserve part of the property of the citizens, or of the produce of the country, or to exact contributions from the citizens, to supply the expense of carrying on the government. It is also entitled to augment the riches of the state by taxing merchandize imported into or exported from the country, and by taking a small part of the things consumed. In the United Kingdom, this branch of the sovereign power is vested in parliament.

The revenue of the crown, in England, has been divided by Blackstone into two branches, designated ordinary and extraordinary; the former attached to the crown by hereditary right, the latter specially granted by parliament as a supply for national purposes. The so-called ordinary revenue was the more important of the two, in the early history of the country, consisting in a great measure of the rents of the crown-lands; but these came, in the course of time, to be dilapidated by alienation and improvident management; and what remains of the hereditary land and forestal revenue of the crown, is now intrusted to certain officers, called commissioners of woods, forests, and land revenues (see WOODS AND FORESTS), who act under the control of the treasury. From the diminution of the hereditary revenues of the crown, subsidies have become the chief source of supply, a circumstance constitutionally of great importance, as it has rendered the crown dependent on parliament for its ordinary support and existence.

The popular voice, in the matter of taxation, was admitted as early as the reign of Edward I., an act of that monarch declaring "that no tallage or aid shall be taken or levied without the goodwill and assent of the archbishops, bishops, earls, barons, knights, burgesses, and other freemen of the land." The laity were thenceforth taxed by the votes of their representatives. The lords spiritual and temporal voted separate supplies for themselves; and from the reign of Edward I., the clergy, as a body, granted subsidies, either as a national council of the clergy, in connection with parliament, or, at a later period, in convocation, till the disuse of this right in the reign of Charles I. As the commons increased in political importance, the subsidies voted by them became the principal sources of revenue, and they gradually assumed their present position in regard to taxation and supply, including the lords as well as themselves in their grants. Concurrently with parliamentary taxation, imposts were formerly levied by royal prerogative alone; but none of these survived the revolution 1688. A grant by the commons is not effectual without the ultimate assent of the queen and house of lords; the lords, however, cannot alter a bill of supply, though they may refuse their assent to it.

The royal speech at the opening of parliament requires the commons to make provision for the public service, and states that estimates will be laid before them. The commons, referring to the royal speech, resolve that a supply be granted. Sitting as a committee of supply, they consider what specific grants shall be voted; and sitting as a committee of ways and means, they deliberate on the manner in which the necessary funds shall be raised. When some progress has been made in voting the estimates, the chancelor of the exchequer brings forward, in the committee of ways and means, his annual statement, popularly known as the budget, embodying his views on the probable revenue and expenditure of the year. Apart from the services voted in detail by the committee of supply, there are some few permanent charges which the treasury is bound to defray from the consolidated fund, such as the interest of the national debt, the civil list, the annuities of the royal family, and the salaries and pensions of judges and some other public officers. When taxes are imposed or altered, the government begins to levy the new duties as soon as the resolutions for that purpose are agreed to by the house. A control is established over the expenditure of the supplies by the long-established practice of separating the custody of the public revenue from the function of payment, the former being vested in the exchequer, and the latter in the treasury, and the officers of the exchequer being empowered to refuse their sanction to any demand not in accordance with the determination of the legislature. By an arrangement effected by 4 and 5 Will. IV. c. 15, the public revenue is now paid into the bank of England, to the credit of the comptroller-general of the exchequer, an officer independent of the ministry, who can only be removed on a joint-address to the crown from both houses of parliament.

The principal sources of revenue are now the customs, the excise, the stamp-duties, the land-tax and house-duty, the property and income tax, the post-office and telegraph service, and the crown lands. The excise, stamps, and taxes have been placed, by 12 Vict. c. 1, under the control of a board called the "commissioners of inland revenue." The aggregate of the different sources of revenue is paid into a fund called the "consolidated fund," founded by 27 Geo. III. c. 47, which is chargeable with the interest of the national debt, and is mortgaged to raise an annual sum for the maintenance of the royal household and civil list (q.v.).

The following table exhibits the gross revenue and expenditure of the United Kingdom, in the year ending Mar. 31, 1876:

Revenue.

Customs	£20,020,000
Excise	27,626,000
Stamps	11,002,000
Land-tax and house-duty	2,496,000
Property and income tax	4,109,000
Post-office	5,950,000
Telegraph service	1,245,000
Crown lands (net)	395,000
Miscellaneous	4,288,693
Total revenue	£77,181,693

Expenditure.

Public debt	£27,443,750
Civil list	406,841
Annuities and pensions	328,110
Salaries and allowances	97,930
Courts of justice	629,652
Miscellaneous services (ordinary)	94,556
Army	15,077,468
Navy	11,063,449
Army purchase commission	501,638
Purchase of Suez canal shares	4,076,565
Miscellaneous civil services	13,119,364
Customs and inland revenue	2,694,393
Post-office	2,982,000
Telegraph service	1,022,000
Post-office packet service	884,054
Fortifications	250,000
Total expenditure	£80,871,770
Excess of expenditure over income	£3,740,087

In the financial year 1877–78 the income was £79,763,298; the ordinary expenditure amounted to £78,903,495, but under the vote of credit of six millions granted on account of the eastern crisis, an additional sum, three and a half millions of pounds, was expended.

In 1801 the gross revenue of Great Britain was £35,218,525, and of Ireland £2,919,217; in 1861–62 Great Britain raised £61,860,749, and Ireland £6,792,606. So that in 1801 the revenue was £3, 7s. per head of population, and in Ireland, 11s. 2d.; while in 1861–62, the amount per head was £2, 18s. in Great Britain, and £1, 3s. 5d. in Ireland. At the conquest, the public revenue of England is estimated to have been about £400,000; and in the reign of Henry VI., it had fallen to £65,000. Under Henry VIII., it rose to £800,000; and under Anne, at the union with Scotland, it was £5,700,000.

The revenue of British India for 1877–78 was given at £58,635,472, and the expenditure at £62.018,853. The revenue of France is about £109,000,000; of Russia, £70,000,000; of Austria, £54,000.000; of Italy, £60,000,000; of Germany (the empire), £22,000,000; and of Spain, £23,000,000.

REVENUE, PUBLIC (*ante*). The sources of revenue collected by the national government of the United States, and their amounts for the fiscal year ending June 30, 1880, were as follows:

From customs duties on foreign imports	$186,522,064
" " fees, fines, penalties, and forfeitures	1,431,269
" sales of public lands	1,016,506
" " " other government property	282,616
" internal revenue	124,009,373
" tax on circulation, deposits, etc., of national banks	7,014,971
" Pacific railroad companies, arrears of interest	1,707,367
" consular fees, etc	2,337,029
" profits on coinage	2,792,186
" revenues of District of Columbia	1,809,469
Miscellaneous	4,603,756
	$692,257,554

The expenditures for the same period are classed under heads, and in gross amounts, as follows:

Civil—Congress	$4,993,470	
Executive	6,374,913	
Judiciary	2,888,430	
Government of territories	169,360	
Sub-treasuries	338,666	
Public land-offices	541,203	
Inspection of steam-vessels	213,569	
Mint and assay offices	174,348	
Total civil		$15,693,963
Interior department—Indians	$5,945,457	
Pensions	56,777,174	
Total		62,722,631
Foreign intercourse—diplomatic and consular salaries and contingencies, relief and protection of American seamen, foreign claims commissions arbitration at Geneva, prisons for American convicts, international exhibitions and commissions, and miscellaneous		1,211,490
Military establishment, in which is included the improvement of rivers and harbors, some national surveys in the territories, the signal service, the support of soldiers' homes and national cemeteries, and soldiers' bounties		38,116,916
Naval establishment		13,536,984
Miscellaneous		37,808,075
Interest on the public debt		95,757,575
Redemption of " "		220,776,177
Premium on redemption of loans		2,795,320
Total expenditures		$488,419,135
Cash in treasury, June 30, 1880		203,838,419
Expenditures and on hand		$662,257,554

The following table shows the sources of revenue from imports in the customs department, on classes of articles paying more than $500,000 duties:

COMMODITIES.	Quantities.	Values in dollars.	Rate of duty.	Duties collected in dollars.	Per cent of value, average.
Animals, living		3,675,518	20 per cent.	735,104	20.
Books, periodicals, and pamphlets		2,059,864	25 "	514,966	25.
Braids—straw goods		2,045,613	30 "	613,684	30.
Breadstuffs, including rice (total)		7,414,444		2,558,677	34.50
Buttons and button molds		3,478,332	30 per cent.	1,043,500	30.
Chemicals, dyes, drugs		13,499,085		4,079,817	30.29
Cotton, manufactures of, total		25,723,252		9,976,418	38.78
Diamonds and precious stones		6,690,911	10 per cent.	669,091	10.
Earthenware and china		5,500,994		2,331,154	42.37
Embroideries		3,115,602	35 per cent.	1,090,460	35.
Fancy articles		5,205,363		2,140,488	41.12
Fish, sardines—quarter boxes	13,378,244	1,478,114	4 c. per box	601,088	51.04
Flax, including linens of all kinds		22,228,438		7,496,661	33.72
Fruits, dried and fresh, and nuts—total		12,695,779		3,401,413	26.79
Furs, and manufactures of		3,823,969		796,125	20.81
Glass, and manufactures of		5,189,285		2,111,368	54.76
Hemp, jute, and other fibers		9,920,009		2,164,148	21.81
Iron, and manufactures of		34,318,531	variable.	14,103,375	41.09
Steel, " " "		11,148,454	"	5,077,249	45.54
Leather, " " "		11,767,481	"	3,411,436	28.98
Paper, " " "		1,590,181		542,159	34.09
Salt		1,750,175		845,298	48.29
Silk, and manufactures of		31,460,947	50 to 60 p.c.	18,556,398	58.98
Spices, " " "		2,099,481	5c to 20c per lb.	1,166,238	55.55
Spirits, " " "		1,748,586	$2 per gall.	2,785,610	159.30
Wines—champagnes		2,321,782		1,134,632	48.86
" still		3,327,251		1,957,294	58.82
Sugar, molasses, and confectionery		77,089,788		42,210,410	54.78
Tin, and manufactures of (lbs.)	369,435,844	16,524,590	$1\frac{1}{10}$c. per lb.	4,063,794	24.59
Tobacco, and " "		6,179,138		4,681,400	75.76
Wood, " " "		6,159,085		1,336,951	21.70
Wool, raw or unmanufactured		17,918,666		7,374,216	41.16
Wool and worsted manufactured cloths, hosiery, and dress goods		30,521,194		21,025,349	58.77
Carpets and carpeting		1,313,352		838,805	63.86
Total import of dutiable goods		$419,506,090		$182,580,217	43.48

The following is a summary of internal revenue receipts from the principal sources, 1863–80 inclusive:

YEARS.	Spirits.	Tobacco.	Fermented liquors.	Banks and bankers.	Penalties.	Adhesive stamps.	Income and other taxes now repealed.
1863	$5,176,130	$3,097,620	$1,628,934	....	$87,170	$4,140,175	$26,982,763
1864	30,329,150	8,592,099	2,290,009	$2,837,720	198,600	5,894,945	67,008,225
1865	18,731,422	11,401,373	3,734,928	4,940,871	520,863	11,162,392	160,688,180
1866	33,268,172	16,531,008	5,220,553	3,463,988	1,142,853	15,044,373	236,296,037
1867	33,542,952	19,765,148	6,057,501	2,046,562	1,459,171	16,094,718	186,954,423
1868	18,655,531	18,730,095	5,955,869	1,866,746	1,256,882	14,852,252	129,863,090
1869	45,071,231	23,430,708	6,099,880	2,196,054	877,089	16,420,710	65,943,673
1870	55,606,094	31,350,708	6,319,127	3,020,034	827,905	16,544,043	71,567,908
1871	46,281,848	33,578,907	7,389,502	3,644,242	636,980	15,342,739	37,136,958
1872	49,475,516	33,736,171	8,258,498	4,628,229	442,205	16,177,321	19,053,007
1873	52,099,372	34,386,303	9,324,938	3,771,031	461,653	7,702,377	6,329,782
1874	49,444,090	33,242,876	9,304,680	3,387,161	364,216	6,136,845	764,880
1875	52,081,991	37,303,462	9,144,004	4,097,248	281,108	6,557,230	1,080,111
1876	56,426,365	39,795,340	9,571,281	4,006,698	409,284	6,518,488	509,631
1877	57,469,430	41,106,547	9,480,789	3,829,729	419,999	6,450,429	238,261
1878	50,420,816	40,091,755	9,937,052	3,492,932	346,008	6,380,405	429,659
1879	52,570,285	40,135,003	10,729,320	3,198,884	578,591	6,237,538	....
1880	61,185,509	38,870,140	12,829,803	3,350,985	383,755	7,668,394	....

The total cost of collecting internal revenue for the year ending June 30, 1880, was $4,505,842; net amount collected, $123,981,916; percentage of cost to collection, .0363 per centum.

Revenues of the several states are derived from taxation of real estate and personal property; the taxes for state, county, and township, or municipal purposes, forming three distinct parts of the whole amount raised, but all subject to the provisions of the state law. In most states the tax for the support of the public schools is included in the state's taxes, but supplemented and added to by towns and cities, as a part of special town taxes. Generally the tax for the state's revenue is much the lightest part of the general tax, the county tax next, and that levied for municipal revenue often largely exceeds both the others. See NATIONAL DEBT, FINANCES, MONEY, TAXATION.

REVERBERATORY FURNACE, a furnace so constructed that matter may be heated in it without coming in direct contact with the fuel. It consists essentially of three parts—viz., a fire-place at one end; in the middle, a flat bed or sole, on which the material to be heated is placed; and at the other end, a chimney to carry off the smoke or fume. Between the fire-place and the bed, a low partition-wall, called a fire-bridge, is placed, and the whole built over with a flat arch, dipping toward the chimney. The flame plays over the fire-bridge, and is reflected, or *reverberated*, on the material beneath, hence the name. See LEAD.

REVERE, PAUL, 1735–1818; b. Boston, descended from Huguenot ancestry, learned of his father the trade of a goldsmith, and served as 1st lieut. of artillery in the colonial army at fort Edward, near lake George, in 1756. Subsequently he established himself as an engraver on copper-plate in Boston, there being then but four such engravers in this country. In 1766 he engraved a print representing the "Repeal of the Stamp Act," and another called "The Seventeen Rescinders," both very popular. In 1774 he published a print of "The Boston Massacre," and "The Landing of the British Troops in Boston." He was a member of the grand jury, which refused to accept the decisions of a judge appointed by the crown to act independent of the people. He furnished the paper money for the Massachusetts provincial congress 1775, and established a powder mill, after learning the art of making powder in Philadelphia. He was one of the Boston men who formed the "tea party" to destroy the tea in the harbor in 1773, and carried the news to New York and Philadelphia. April 18, 1775, by order of gen. Warren, he took the memorable midnight ride through Charlestown to Concord and Lexington, to warn the people of the approach of the British under gen. Gage, and displayed the signal lanterns in the steeple of Christ church, Salem street, in Boston. He was grand master of Freemasons. After the war he established copper rolling mills at Canton, Mass., and a foundry for casting church bells and cannon. In 1871 a part of Chelsea was set off and named in his honor.

REVEREND (Lat. *reverendus*, to be respected), a title of respect given to the clergy. In Roman Catholic countries, it is applied to the members of the different religious orders. In France, before the revolution, archbishops, bishops, and abbots were alike "most reverend." In England, deans are "very reverend;" bishops, "right reverend;" and archbishops, "most reverend." In Scotland, the clergy in general are "reverend," while it is the practice to apply "very reverend" to the moderator of the general assembly for the time being, to a synod, and to the principal of a university, being a clergyman. The general assembly itself is usually styled "venerable," but the address of the lord high commissioner begins with the words: "right reverend and right honorable."

The style reverend is generally adopted by, and given to, the clergy of the different dissenting bodies; but there have been instances in which some of them have repudiated it.

REVERIE has been defined the dream of a waking man; it differs, however, in many respects, from dreaming. In an exaggerated form, it is of rare occurrence; but when exceeding absence of mind, or abstraction from what is passing around, it is abnormal and unhealthy; and may, under all circumstances, be regarded as a phenomenon of an imperfectly constituted, if not of a diseased nervous temperament. It is, moreover, generally, and always at its commencement, under the control of the will. Reverie is apparently, in all cases, and exaltation of the faculty of attention: the mind may be occupied according to the age, character, pursuits of the individual, by calculations, profound metaphysical inquiries, by fanciful visions, or by such trivial and transitory objects as to make no impression upon consciousness, so that the period of reverie is left an entire blank in memory. The most obvious external feature marking this condition is the apparent unconsciousness, or partial perception, of external objects. In what may be designated the first stage, castle-building, this inattention is only apparent, as the surrounding scenery may enter into the illusion, and constitute a part of the romance, In the celebrated case of Hartley Coleridge, whose double life, indulged in for years, affords illustrations of voluntary creations ultimately extorting a degree of belief and expectation—from a field near his home burst forth a cataract, from which flowed a river; on the banks of this arranged themselves fertile fields, a populous region, divided into realms and kingdoms, governed by laws, having traditions, histories. "Ejuxria" was, in fact, an analagon to the world of fact, embellished by imagination. This cherished unreality was parted with reluctantly. A more advanced stage of the affection is where, independently of the will, and in opposition to the ordinary habits of the individual, and under peculiar circumstances, there occur a loss of cognizance of surrounding objects and relations, and a state of abstraction or brown-study, in which many absurd and incongruous things are said and done. Ludicrous examples of this state are witnessed where a man loses his way in his native town, forgets his own name, or retires to bed in the middle of the day. It is related that sir Robert Peel, utterly unobservant of the adjournment of the house of commons, and the departure of the members, remained on one occasion unmoved in his seat, plunged in a profound reverie, until the lights were about to be extinguished, and he was roused by the clerk of the house. In a third stage or form, the reverist cannot be recalled to active perception, loses individuality, and is absorbed in the contemplation of unreal, though self-suggested impressions. This is seen in such cases as St. Teresa, and in the trances of Mysticism, Quietism, Second Sight. —*Memoir of Hartley Coleridge*, Disraeli's *Life of Lord G. Bentinck*, Maury's *Le Sommeil et les Rêves*.

REVERSE, in numismatics, the side of a coin or medal which does not bear the principal device or inscription. There is, however, generally an inscription or device on the reverse; and when the lower part of it is markedly separated from the rest, it is called the EXERGUE (Gr. *ex ergou*, without the work), and bears a secondary inscription.

REVERSED, in heraldry. A term applied to a charge turned upside down.

REVERSION. When the enjoyment of money, or of any kind of property is postponed until, or contingent on, the happening of a given event or given events, the present right to the deferred benefit is called a reversion. When the emergence of the right is certain, and the date fixed, to ascertain the immediate or marketable value of a reversion, is a very simple calculation; for example, let it be required to knew for what sum a man should sell the right to receive £100 payable ten years hence. Suppose that he expects to be able to improve the money for which he sells his right at five per cent. per annum, compound interest, then one obvious way to get an answer to the question is simply to calculate what sum annually accumulated at the assumed rate will in ten years amount to £100. The answer (see art. INTEREST) will be found to be £61, 7s. 10d. When the date of the emergence of the reversionary right is uncertain, the purchase, in an individual case, must always be a speculation; but if there are a sufficient number of such rights, postponed to events of which there are sufficient observations from which to deduce laws of average, then the marketable value is easily calculated: for example, it is required to know what is the immediate value of £100 payable certainly on the death of a man aged 60. Here the perpetuity divides itself into the present value of an annuity of the annual interest of the £100 on the life of a male aged 60, and the reversionary right which is to emerge when the life fails. Having then ascertained the former value, and deducted it from £100, the remainder will be the present value of the reversion. When an assurance company buys a reversion, it is simply buying that which it sells when it grants a policy of life assurance. In the former case, however, an office, to secure its expenses and profits, will assume a high rate of interest and a long life; in the latter case, for the same reason, it will assume a low rate and a short life. Where the reversion is contingent, problems arise whose solution requires the utmost skill on the part of the actuary; for instance, B, aged 30, wishes to borrow £100 on the security of a sum payable to him *in the event* of his surviving A, aged 58. Here the security being doubtful, it could only be rendered marketable by assuring a sum to be paid in the event of B dying before A; and there would remain the important question of what this sum should be, so as to cover the loan and the premiums of assurance with yearly accumulations on both. This question will be found ably discussed in a paper by Mr. Lang in the *Assurance Magazine* for 1850, p. 18.—On the general subject, see the same work for 1851, paper by C. Jellicoe, Esq.; do. for 1855, p. 239, paper by Robert Tucker, Esq.

REVERSION is that right to property which remains after some particular estate has ceased which had been granted by the owner. Thus, if A has a life estate in B's property, and after he dies, the property returns to B, B is said to have the reversion, or to be the reversioner. The landlord of property let to a tenant is called the reversioner, because, the moment the lease determines, the whole of the property and possessions vest in him. In the sale of reversionary estates, owing to the want of a system of registration of deeds, great risk is incurred by the purchaser lest the property should be burdened by some rent-charge.

REVETMENT, in permanent fortification, is a retaining-wall of masonry built for the purpose of holding back the earth of which works are composed. The most ordinary position of revêtments is for the escarp and counterscarp of the ditch (see FORTIFICATION). The most important of these two is the escarp, which has to hold back the great mass of earth represented by the rampart, parapet, banquette, etc. It is usually of solid brickwork or stone, 5 ft. thick at the top, and sloping outward as it descends (on the ditch-side only) to the extent of 1 in 6. Prior to Vauban's time, the escarp revêtment was commonly raised to the top of the parapet: but as in this case the artillery of a besieger played on the top of the wall, and ruined it soon after the siege commenced, that engineer adopted the principle—thenceforth followed—of raising it no higher than the crest of the glacis, or about 7 ft. above the natural ground, leaving the parapet above of sloped earth only. When the main ditch is 24 ft. deep, the scarp revêtment will be about 30 ft. high. Additional strength is imparted to the revêtment wall by massive buttresses at every 15 ft., called *counterforts,* and these, again, are sometimes connected and strengthened by masonry arches outside the revêtment. The revêtment forms a terrible barrier to an assaulting party. In field-works, temporary revêtments may be made of timber, turf, hurdles, or other materials at hand.

REVIEW, in military parlance, is the inspection by the sovereign or some staff-officer of any body of troops in parade order. Reviews always comprise a march past the inspecting-officer in column, and a general salute in line; to these is frequently added a mock-battle, for the amusement of spectators, and the practising of the troops themselves in warlike maneuvers.

REVIEW. The name applied by common literary usage to such periodical publications as are made up of critical essays. See PERIODICAL.

REVISING BARRISTER is a barrister appointed annually by the English judges to revise the lists and settle who are the persons entitled to vote for members of parliament. For this purpose all England is subdivided into districts, and a barrister is appointed for each district by the judges of assize. Though the appointment is only for one year, yet practically the same person is reappointed for life. The barrister must be of three years' standing at least. The revision of the lists takes place generally between August and October of each year. There is an appeal from the decision of the revising barrister to the court of common pleas at Westminster.—Similar duties are performed in Scotland by the sheriff-substitute.

REVI'VALS OF RELIGION. The term *revival of religion,* or more briefly, *revival,* is employed to denote an increase of faith and piety in individual Christians, particularly after a period of religious declension, and also an increase of religion in a community or neighborhood, both through the *revival* of those who are already religious, and through the *conversion* of the previously irreligious. In these applications, its use is countenanced by several passages of Scripture; the idea which it is intended to convey is, however, far more frequently suggested by passages in which the term does not occur. The idea of revival is more particularly connected with the system of "evangelical" doctrine, and particularly with that part of it which relates to the work of the Holy Spirit in the conversion of sinners.

What are commonly called revivals of religion may be described as religious movements or excitements extending, more or less generally, over a neighborhood, or sometimes over a country. By those who regard them as genuine, it is urged in their favor, that they are in accordance with what the Scriptures teach us to expect, and that we have instances of a similar kind recorded in the Scriptures themselves—both in the history of the Jews, and in the early history of the Christian church, particularly in the effusion of the Holy Spirit on the day of Pentecost, and afterward in connection with the ministry of the apostles when many were converted through a single discourse, or, in other cases, evidently within a short time. It is further urged that the promise of the effusion of the Spirit in "the latter days" was not completely fulfilled on the day of Pentecost, but relates to the whole period of the Christian dispensation, and that, according to many prophecies, we have reason to expect even more of it in future times than there has ever hitherto been, so that "a nation shall be born in a day, and the kingdoms shall be the Lord's." The reformation of the 16th c., and the more partial movements of the same kind which preceded it, are also regarded as essentially revivals of religion—the reformation itself the greatest which has taken place since the apostolic age. The great development of religious fervor in England in the 17th c., is, according to this view, to be considered as a revival, and the extravagances which attended it as mere excrescences, like those of the Anabaptists in the time of the reformation. The next great movement of the same kind was that in the first half of the 18th c., from which the Methodist churches originated (see METHODISTS). It was accompanied with many circumstances similar to those which have attended later revivals of religion. The term revival did not begin to be commonly employed till after this period; and the revival which took place in New England and other parts of North America about the same time was then and still is generally designated the *great awakening*. The beginning of this revival seems to have had no connection with the Methodist movement in England, although subsequently they became connected through Mr. Whitefield's visits to North America. The revival in New England, which began about 1734, under the ministry of the celebrated Jonathan Edwards at Northampton, and rapidly extended over great part of New England and New York, was speedily followed by similar religious movements in Scotland, not altogether independent of it. Such religious movements had not, however, been unknown in Scotland before, although very much confined to particular times and localities. In 1625 and some following years, there was a revival at Irvine, under the ministry of Mr. David Dickson—a minister of more than ordinary abilities and attainments, some of whose works have recently been republished—so considerable as to be noticed in many histories of the church of Scotland, and which, because it extended very much to the neighboring parish of Stewarton, and along the banks of the Stewarton Water—the people of that district frequenting Irvine on market days, and hearing Mr. Dickson's lectures—was contemptuously styled by its adversaries the *Stewarton sickness*. In 1630 several hundreds are said to have been converted at once, through a sermon preached at Kirk-of-Shotts by Mr. John Livingstone, then a young preacher, but afterward an eminent minister of the church of Scotland, and a sufferer for the cause of Presbyterianism. About the same time (1623–41), similar movements took place in Ireland under the ministry of Scottish Presbyterian ministers settled in Ulster, and to which the origin of the Irish Presbyterian church must in great part be ascribed. The Presbyterians of Scotland were thus in some measure prepared to acknowledge the revivals of the earlier part of the 18th c. as genuine, which began at Cambuslang—Mr. M'Culloch being minister of that parish—in 1742, and speedily extended to Kilsyth and other parishes in the neighborhood, as well as to Dundee and other places more remote. No similar movement, however, took place over the country generally; nor was there anything of the same kind again till the very end of the century, when a revival took place (1798–1800) at Moulin in Perthshire, of which Mr. Alexander Stewart was then minister. This was followed in a few years by a revival in Arran (1804–13), under the ministry of Mr. M'Bride. Other similar local revivals followed, not unfrequently, and in parts of Scotland widely remote from each other, both in the Highlands and Lowlands; and also in other parts of Britain, particularly a very extensive one in Wales, resulting in the formation of the Welsh Calvinistic Methodist church, but not confined in its effects to those who became connected with that church. Local revivals also in some instances attended the ministry of evangelical ministers of the church of England.

In 1839 the attention of all Scotland was drawn to a religious movement at Kilsyth, which was followed by similar occurrences in a number of other places, more or less evidently connected with it. The first appearance of an unusual degree of religious feeling at Kilsyth was in the parish church, during a sermon by Mr. William C. Burns, a son of the minister of the parish, and afterward a missionary in China. The emotion of many of the congregation broke out in sobs and cries, so that for a time the preacher's voice could scarcely be heard. For months religion was the almost exclusive subject of interest to a great part of the inhabitants of the parish, and many meetings for public worship were held besides the ordinary Sabbath services, at which great emotion was often displayed. Among the other places to which this movement notably extended was Dundee, where Mr. W. C. Burns was then statedly employed in the ministry of the gospel. After 1839 there were revivals from time to time in various places in Scotland; but none of great extent or interest there or elsewhere in the British islands for nearly twenty years. There had, meanwhile, been many revivals in America generally, indeed, confined to particular congregations, seminaries, or localities, but sometimes extending over considerable districts; and throughout at least the northern and middle parts of the United States, the idea had become familiar to the popular mind, that revivals of religion ought to be expected from time to time; from which naturally followed the belief, that means ought to be employed to produce them. From this resulted, in some cases, increased earnestness in preaching and prayer, with greater assiduity in the use of all the ordinary means for the promotion of religion; in other cases, direct endeavors to produce excitement, as by *camp-meetings*—assemblies of great numbers of people held in the open air, at which exciting addresses were delivered by preacher after preacher, to work upon the nervous sensibilities of the audience.

Nothing of this kind, however, attended the commencement of the great religious movement which took place in 1857 and in the two following years. Its origin is ascribed in part to the thoughts and feelings awakened during a period of great commercial distress. It began in New England, particularly in Connecticut and Massachusetts, and rapidly extended to New York and over the middle and western states. It was not generally attended with scenes of great excitement. Strong but calm religious feeling was its general characteristic. In the city of New York, almost every congregation received a great accession of members, and prayer-meetings were held for about an hour in the middle of the day, which were attended by great numbers of persons actively engaged in business. More than 2,000 places in the state of New York were reported as partaking of this revival. Not long after it began in America, a similar movement took place in the north of Ireland, not apparently connected in its origin with that in America, although certainly connected with it soon afterward, and promoted by the news brought across the Atlantic. It rapidly extended over the whole north of Ireland, and subsequently to many parts of Scotland, Wales, and some parts of England. As a rule, it was free from excitement, and characterized by little else than the intensity of religious feeling displayed. Another remarkable revival, which extended over the greater part of Great Britain in 1874-75, originated in the efforts of two American evangelists, Messrs. Moody and Sankey, and was characterized by the almost entire absence of sensationalism.

Revivals of religion have occurred also in other parts of the world. About fifty years ago a widespread movement of this kind took place in Switzerland, although not affecting more than a small part of the population anywhere. Under the ministry of Felix Neff, it subsequently extended to the Protestant districts of Dauphiné, and to the neighboring Vaudois or Waldenses, on the Italian side of the Alps. Similar religious movements have occurred in many parts of Sweden.

Revivals have been accounted for in very different ways; but in general, too evidently in mere accordance with the different religious views of those by whom the theories have been proposed. Some have attempted to explain the phenomena of religious excitement extending over wide districts, and rapidly spreading from one place to another, by the supposition of a kind of epidemic disease affecting the mind. Another opinion very prevalently entertained by those who do not see in revivals anything really good, is, that they are the result of endeavors to work upon the feelings. It is replied, that although this theory might be plausibly enough advanced, if only such things were considered as the camp-meetings of the American Methodists, it is far from being in accordance with the best ascertained facts as to many of the revivals which have taken place both in America and in other countries. It is certain that many of these have taken place without any apparent attempt to work upon the feelings, more than is ordinary and proper in the preaching of the gospel, and that the greatest display of emotion has often been connected with preaching of the most simple and sober kind.—By those who believe in the reality of revivals, as productive of a true increase of religion, they are generally ascribed to the operation of the Holy Spirit, to which, according to the "evangelical" scheme, the "conversion" of every individual soul is ascribed, and also all increase of faith and piety in the converted. Revivals have, however, often been regarded with doubt by many who believe in the whole doctrine of the work of the Spirit as generally held in the Protestant churches, but who look upon the excitement frequently attending them as inconsistent with the proper sobriety and solemnity of religion, and think the progress of religion ought rather to be expected to be gradual, and without very much to call particular attention to it at one time more than another. It is replied, that while a blessing on the regular use of ordinances may confidently be expected, if duly sought by prayer, there is yet much in scripture to favor the notion that particular seasons may be unusually marked by the evidence of it; and further, that revivals, when they take place, generally show the usefulness of the ordinary means employed for the promotion of religion, as they seldom occur among persons very ignorant of religion, but rather among those who have previously enjoyed the benefit of the most faithful ministrations. With regard to the excitement attending many revivals, it is argued that this excitement is not wonderful, if persons are suddenly impressed with a deep sense of their sins, of the danger of divine wrath, and of the importance of religion; and that it is in some measure also to be expected in those who are brought by a quick transition from deep distress to a full sense of forgiveness and the favor of God. Are we to be surprised, it is asked, if persons in such circumstances, after much effort of self-restraint, cry aloud in the congregation, or fall down, overpowered by their emotions? It is sometimes alleged by the opponents of revivals, as an objection to them, that much of the excitement manifested in them is merely hysterical; and some of their advocates have rashly denied that this is the case; others, admitting it, deny that it affords any just cause of objection, and maintain that hysterical excitement is natural and unavoidable in such circumstances, and however undesirable in itself, is a manifestation of the reality and strength of the feelings awakened. They acknowledge, however, also, that like similar excitement produced by causes which have nothing to do with religion, it may extend from one to another, even where the cause in which it originated does not operate; and they therefore refuse to see in it, considered by itself, any evidence of the religious or spiritual condition of the persons affected by it.

That much folly and extravagance have often been exhibited in connection with revivals of religion is freely admitted by many who are fully convinced of their reality; but this, they say, is also only what might be expected, as the occasion always seems a favorable and inviting one to persons whose zeal exceeds their discretion, and too often affords opportunity for ignorant and self-conceited persons to thrust themselves forward as teachers and conductors of religious exercises.

It may be proper to advert to some of the practices which sometimes take place on occasions of revival, but which are disapproved by all except those who are filled with the desire of seeing excitement produced and increased. Among these is the bringing forward of persons in the character of new converts, to conduct prayer in public, and to address meetings, which they are often among the least capable of doing well. Another practice liable to much objection is the permitting of mere youths, under profession of Christian zeal, to converse in private with persons in distress of mind, especially when these are young persons of the other sex. A third objectionable practice is the calling upon those who are anxious about their salvation to come forward and occupy a place by themselves—or what are called in America *anxious seats*—that they may be individually conversed with, and that special prayer may be made for them, they being thus brought into a publicity which is undesirable. It is hardly necessary to refer to the absurdity of demanding—as has sometimes been done—a show of hands from those who are now resolved to give themselves to the Lord! With such uncommendable practices may be classed that of encouraging persons who have been of very profligate life to recount their own history, which has sometimes been carried so far that they have seemed even to glory in the enormity of their past wickedness.

Certain peculiar modes of expression, which might not unaptly be designated a kind of slang, have often come into use in connection with revivals of religion, with the unhappy effect of exciting disgust in many minds, and particularly among the most educated classes of society. Thus, in the revival of last century in New England, the subjects of the revival—in a certain state of their experience—were spoken of as being *filled*. In the recent revival in Ireland it was common to speak of those who fell down suddenly in congregations or in their own houses as *stricken*, and as the *stricken ones*. It was very common during the same revival to speak of individuals as having *found peace;* and this finding of peace was by some regarded as proof of conversion, or even as indicating the moment of conversion—all which was considered by many who fully believed in the reality of the revival, as unscriptural and delusive.

Among the evils acknowledged to attend revivals by those who believe them to be real, but who also believe that there is often much connected with them which is not the work of God, is the disposition to judge of the spiritual state of individuals, as converted or unconverted. *New converts*, especially when brought into undue prominence, are apt to become elated and self-satisfied, and even to regard themselves as the only true Christians, or as superior to those whose piety is of much longer standing than their own. This, however, is not always the case, and much depends on the judicious or injudicious conduct of the ministers chiefly concerned when a revival takes place.

We have endeavored to present this subject fairly to our readers; but it is evident that as to the opinion to be formed by any one, much must depend upon the general religious views which he entertains. As to mere religious excitement, however, and bodily affections resulting from it, many facts may be adduced to show, what might be supposed beforehand, that these may be connected with religious views extremely at variance. Excitement may be produced by religious views that are utterly false, as well as by those which are true. Heathenism has always abounded in it; Mohammedanism has much of it; and it has appeared in the church of Rome as well as in the Protestant churces. It is not necessary to do more than allude to the extravagances of the flagellants, and to the strange scenes of the dancing mania. Some of the small sects, also, which evangelical Protestants regard as most heterodox, seem to maintain their existence by a systematic working up of excitement.

The subject of this article has been treated in a multitude of publications, almost every revival which takes place calling forth new pamphlets, narrative and controversial. The works of Jonathan Edwards deserve the first attention of those who wish to study the subject; and much information as to the history of revivals will be found in Gillies's *Historical Collections relating to Remarkable Periods of the Success of the Gospel.* Reference may also be made to Mrs. Lundie's work on *Revivals in the British Isles;* and for the revivals in Scotland in the middle of the 18th c., to Robe's *Narrative of the Revival of Religion at Kilsyth, Cambuslang, and other Places, in* 1742 (new ed., Glasgow, 1840). Edwards maintains the genuineness of revivals with perhaps more force of argument than any writer has since done; and most of those extravagances which have sometimes attended revivals down to the present time, might have been avoided if those whose religious views accord with his had more carefully studied his discriminating remarks and sober counsels. No work has yet been produced such as Edwards in one of his letters expresses a strong desire to see—"a history of true, vital, and experimental religion, and enthusiasm, bringing down the history from age to age, judiciously and clearly making the distinction between the one and the other.

REVI'VOR is a bill or writ by which a suit or action is kept alive in the English courts of equity or law, where one of the parties dies during its dependence.

REVOCATION, when used as a legal term, is the withdrawing or annulling of a deed or will which otherwise would be valid. A will is said to be always subject to revocation, even though the testator say in the most express language that it is not to be revocable, because a will is supposed to be subject to the ever-varying occasions of life. On the other hand, a deed is not capable of revocation, and is in its nature final and irrevocable; but if an express proviso is inserted which reserves a power of revocation, then this is a valid power, and may be exercised, provided the directions of the deed are strictly followed.

REVOLUTION, in politics, any extensive change in the constitution of a country suddenly brought about. The two most important events in modern history known under this name are the English revolution of the 17th c. and the French revolution of the 18th. The former began in the early part of the reign of Charles I., with the struggle between that king and his parliament. In 1642 the struggle became a civil war, in which the parliament obtained the ascendency, and brought Charles to the block in 1649. A republic followed, under the protectorate of Oliver Cromwell, which was succeeded in 1660 by the restoration of monarchy in the person of Charles II.; but the arbitrary rule of James II. brought the king and people again into antagonism; and James having fled the country, William III. was called to the throne under such conditions and safe-guards as secured the balance of the constitution.—The French revolution was a violent reaction against that absolutism which had come in the course of time to supplant the old feudal institutions of the country. It began with an outbreak of insurrectionary movements at Paris in July, 1789, including the destruction of the Bastille. On Jan. 21, 1793, king Louis XVI. was beheaded. The Christian religion was deposed, the sacredness of the republic and worship of reason solemnized, and a disastrous reign of blood and terror followed, which was brought to an end in 1794, when Robespierre himself suffered on the guillotine the fate to which he had condemned countless multitudes of his countrymen.

Among other important revolutions in the modern world are the American revolution of 1775, by which the United States threw off their dependence on Great Britain; the French revolution of 1830, which drove Charles X. into exile, and raised Louis Philippe duke of Orleans to the throne by the will of the people; as also the revolution of 1848, when France rose against Louis Philippe, and adopted for a time a republican form of government, the revolutionary contagion spreading temporarily over most of continental Europe. By the Italian revolution of 1859–60, the various minor sovereigns of Italy were driven into exile, and the whole of the peninsula became, with the incorporation of the Roman territories in 1870, subject to Victor Emmanuel. The third French republic was also established in 1870–71 by a revolution.

REVOLUTIONARY TRIBUNAL, the name specially given to the infamous court of judgment—the most extreme republican will scarcely affirm that it was a court of justice —instituted by the French convention in Mar 1793, on a motion made by Danton (q.v.), who considered that such a court had become necessary, inasmuch as the recent disasters that had befallen the national armies on the frontiers had led to dangerous conspiracies against the revolutionary government. Its members were chosen from the various departments, and their appointment was ratified by the convention. Their function was to sit in judgment on all persons accused of crimes against the state, and from their sentence, delivered with appalling promptitude, there was no appeal. During the "reign of terror," when Fouquier-Tinville (q.v.) was "public accuser," it acquired a horrible notoriety, abolishing soon almost all forms of justice, neither hearing witnesses on behalf of the accused, nor allowing him an opportunity of defense, but blindly executing the orders of the "committee of public safety," which was merely a tool in the hands of Robespierre (q.v.).—In the provinces, similar tribunals, under the name of "revolutionary committees," were established, the commissaries-general of which, as, for instance, Carrier (q.v.), shot or drowned *suspects* in crowds.

REVOLVER, in fire-arms, is a weapon which, by means of a revolving breech or revolving barrels, can be made to fire more than once without reloading. The invention is very far from new, specimens, with even the present system of rotation, being still in existence, which were manufactured at the beginning of the 17th century. Probably the first revolver to suggest itself was one in which several barrels were mounted on an axis, and made to revolve by the action of the trigger, so that their powder-pans came successively under the action of the lock. This principle was never entirely abandoned. and in the reign of George IV. was produced a pistol called the "Mariette," which had from four to twenty-four small barrels bored in a solid mass of metal, made to revolve as the trigger was drawn back. At close quarters, such a pistol would doubtless have been useful; but its great weight and cumbrous mechanism rendered aim extremely unsteady.

Contemporaneously from the first with the revolving barrels, went the formation of a revolving chamber or breech, pierced with several cylindrical apertures to receive the charges. Being made to revolve, each motion brought a chamber into line with the one barrel, common to all, whereupon the weapon was ready for use. Numerous patents for this principle have been taken out, including one by the celebrated marquis of Worcester in 1661. Various improvements were made, especially in the mode of causing revolution, an American, of the name of Elisha H. Collier, patenting such a weapon in the United States and England about 1818. In 1835 col. Samuel Colt brought to a conclusion experiments of some years' standing, and patented his world-renowned Colt's revolver, which was a great advance on all previous attempts, and is substantially still in use. Colt's revolver consists of one rifled barrel of considerable strength and a massive chamber perforated with six or seven barrels, which are brought into a line with the barrel by action of the trigger. Each chamber has its nipple for a cap, which is brought under the hammer by the motion which brings the chamber or breech-piece round. In the most recent form of this revolver, the capped nipple disappears, the cap being contained within the cartridge. The hammer is discharged by the trigger, and acts nearly horizontally in a forward direction. Under the pistol is a fixed lever-ramrod, which is used in loading the chambers. Besides all this, by withdrawing a bolt, which can be done in a moment, the entire breech-piece can be taken out, and replaced by another ready charged, so that by carrying a spare breech-piece, a person may fire twelve shots in less time than another could fire three if he had to load between the shots. Colt's revolvers are now extensively used in the naval and military services of America and Europe.

The principal rival of Colt's revolver has been the Deane and Adams revolver, although many more of various sorts have been patented in the interval. The "Deane" differed in that it could be fired by merely pulling the trigger without also raising the hammer with the finger, as in Colt's; but this was found to be so dangerous in practice that the inventors soon substituted an arrangement under which it could be fired either by the trigger or by raising the hammer; and lastly, they introduced the great improvement of a spur behind the trigger, which must be pressed by the middle finger, while the forefinger discharges the piece through the trigger. The revolver principle has also been successfully applied to the manufacture of a kind of revolving guns for small projectiles, which are really aggregates of small-arms. The Gatling gun, a revolver of this class, in which the several barrels turned round a common axis, was used during the American civil war. But the best known gun of this description is the French *mitrailleuse* or *mitrailleur*, of which so much was heard during the Franco-German war. That most commonly used had a group of 25 barrels, surrounded by a bronze sheathing, and movable breech-piece; it was fired by means of a crooked handle or winch at the right-hand side. The range of such guns in a level plain is not great; but among fortifications, or in a narrow valley, they may be used with very deadly effect.

REVULSION, in medicine, a term synonymous with derivation (q.v.). See also COUNTER-IRRITANTS.

RE'WAH, a state of India, called also BAGHELCUND, lying between the north-western and the central provinces, subsidiary to the government of the latter, and having for its capital a town of the same name, which is 70 m. s.w. from Allahabad, and stands on the right bank of the Tons. The town has a pop. of about 7,000. It exhibits remains of former magnificence, but even the walls and the rajah's palace are much decayed. The state has an area of about 13,000 sq.m., and great part of it is well cultivated. The pop. is about 2,035,000.

REWARD, when used in a legal sense, means a sum of money awarded by a court or judge to a witness who has been instrumental in detecting crime. By an English act of parliament of 1827, whenever it appears to a court of assize that a person has been active in apprehending offenders charged with murder, or with feloniously shooting, stabbing, cutting, wounding, or poisoning, or with rape, burglary, house-breaking, robbery, arson, or cattle-stealing, or with receiving stolen goods, the court may order the sheriff of the county to pay to such person a sum of money, to compensate his expenses, exertions, and loss of time. So courts of quarter sessions may order a reward not exceeding £5. If any man happen to be killed while endeavoring to apprehend a criminal charged with any of these offenses, the court may also order a sum to be paid to the widow or child. The going to foreign countries to apprehend criminals, is not considered to be a proper ground for giving these rewards. Nor is ordinary stealing from the person a crime which is within the act. Sometimes persons whose property has been stolen inconsiderately offer a reward for its restoration, and persons offer to recover it for a sum of money. The following enactments of the statute 24 and 25 Vict. c. 96, are directed against this practice. Whoever corruptly takes any money or reward, directly or indirectly, under pretense of helping any person to any chattel, money, valuable security, or other property which shall have been stolen, embezzled, or illegally disposed of, shall be guilty of felony, and be liable to penal servitude for seven years, or imprisonment for two years. A person may commit this offense though he has no knowledge of or connection with the thieves. Moreover, whoever shall publicly advertise a reward for the return of any property stolen or lost, and shall in such advertisement use any words purporting that no questions will be asked, or that a reward will be given, without seizing or making any inquiry after the person producing such property, or shall offer or promise to return to pawnbrokers or others any money advanced on such stolen or lost property, shall forfeit £50; and whoever shall print or publish such advertisement, shall forfeit the same sum.

REWARDS FOR DISTINGUISHED MILITARY SERVICE are annuities—most commonly of £100 each—granted to meritorious officers in consideration of distinguished service. The officers to whom they are awarded are usually major-generals or colonels, though a few paymasters, quartermasters, and medical officers receive these annuities, which, however, in their case do not always amount to £100. The officer holds the annuity until, being a general officer, he is appointed colonel of a regiment. The amount given to officers in 1876–77 was £21,700; to sergeants, £5,000, besides £840 for Victoria Cross pensions, and £8,000 for gratuities for long service, etc.

REY'KIAVIK. See Iceland.

REYNARD THE FOX, the title of a celebrated epic fable of the middle ages, belonging to, and terminating the series of poems in which "beasts" are the speakers and actors. It is written in low-German, professedly by a Hinreck van Alckmer, "schoolmaster and tutor of that noble virtuous prince and lord, the duke of Lorraine," and was printed at Lübeck in 1498, under the title of *Reineke Vos;* but German critics in general are disposed to believe that no such person as Hinreck van Alckmer ever existed—he is nowhere else mentioned in history, literary or otherwise—and that the real author is a Hermann Barkhusen, town-clerk and book-printer in Rostock, who, according to a common enough practice, sent his book into the world under a pseudonym. A Rostock edition appeared in 1517, which was long believed to be the earliest, until the discovery of a copy—the only one known to exist—of the older Lübeck edition in the Wolfenbüttel library by prof. Hakemann, who published it in 1711. Since then the work has been repeatedly republished in Germany—the best edition being that of Hoffmann von Fallersleben (Bresl. 1834; 2d edit. 1852), which is enriched with an "introduction," "notes," and "glossary."—At a comparatively early period, translations were made from the Rostock edition into high-German, that of Mich. Beuther (Frankf. 1544), though badly executed, passing through more than 20 editions. The high-German translation was retranslated into Latin verse by Hartmann Schopper (Frankf. 1567), and thus gradually found its way into other countries. Goethe translated the work anew into modern German hexameters with admirable spirit and freshness (Berl. 1794), and his translation has been charmingly illustrated by Kaulbach (Mun. 1847): later translations are those by Soltau (Berl. 1803) and Simrock (Frankf. 1845–52), both of which are executed in the measure of the original—i.e., rhymed iambic couplets. A Danish translation in verse by Herm. Weiger was published at Lübeck in 1555; a Swedish, at Stockholm in 1621—prose version, 1775.

This brief outline of the literary history of *Reineke Vos*, leads us to the second and even more important part of the subject. Was that work strictly an original product of the author's fancy, or was it merely the final form assumed by a wide-spread fable? Till Jakob Grimm published the results of his laborious researches, everybody supposed that the poem printed at Lübeck in 1498, by whomsoever composed, was the earliest literary embodiment, if not the direct source, of the fable; but that opinion is no longer tenable. Grimm has shown that, in one form or another, the "beast-fable" (Ger. *Thier-sage*) goes back to the remotest antiquity, and is a common inheritance of the Aryan or Indo-Germanic races—Hindus, Celts, Greeks, Romans, Slaves, Esthonians, Germans—and even the Finns; and he explains with great clearness the conditions of thought, intellectual and religious, under which such a literary form is developed. But all nations do not attain equal success in its cultivation, and it was among the Germans, particularly the Franks, that it attained its most complete poetical elaboration. Grimm is, however, inclined to think that the particular fable of *Reineke Vos* is of German rather than Oriental origin (although the Persian version of Pilpay's fables, entitled *Anvár-i Suhaili*, or the Lights of Canopus, translated by Mr. Eastwick, Hertford, 1854, contains a story strikingly similar), and that the Franks brought it with them to the Netherlands and to France, where (and not in Low-Germany) it first appeared. Grimm published, in the *Lateinische Gedichte des* 10 *und* 11 *Jahrh.* (Gött. 1838), some small pieces, containing the nucleus or germ of the fable, and showing how soon, in the hands of the verse-loving monks, it had been turned to didactic and satiric purposes. Somewhat later other stories make their appearance, bearing more or less on the history of Reynard, but none of them setting forth the fable in the same manner as we now have it—the two principal being *Isengrimus* (apparently the composition of an ecclesiastic in southern Flanders about the beginning of the 12th c., and containing two stories of the wolf) and *Reinardus* (also originating from a Flemish ecclesiastic named Nivardus, which, besides an expansion of the *Isengrimus*, contains ten new stories; its date is about half a century later). But while, in these clerical compositions, side-allusions to the papacy, to the discipline of the church, and to the then powerful and flourishing order of the Cistercians, are very noticeable, in the mouth of the Franco-Flemish people, on the other hand, the story kept itself free of such temporary phenomena, and gradually shaped itself into a style of pure epic satire, reflecting general human characteristics. Before the close of the 12th c., this purer and more epic form of the satire found its way into both German and Flemish literature. In the former, this happened about 1170, when Heinrich der Glichezare (i.e., Henry "the Feigner" = Inventor or Troubadour), a native of Alsace, wrote in High-German his *Isengrînes nôt;* and again in Flemish, a little later, when a poet, whose name is scarcely known, wrote *Der Reinaert*, a work of the purest epic character, and far surpassing all its predecessors both in conception and execution. Both works were afterward redacted by unknown hands—the German about the beginning of the 13th c., when its redactor gave it the title of *Reinhart* (published by Mailáth und Köffinger, in the "Koloczaer Codex," Pesth, 1818; and again in a purer state, with all his valuable historical investigations, by Jakob Grimm, *Reinhart Fuchs*, Berl. 1834); the Flemish, about the close of the 13th c., when it received the name of *Reinaert de Vos*, part of which appeared in Grimm's *Reinhart Fuchs*, but the whole of which was published by J. F. Willems (Ghent, 1836–50), at the expense of the Belgian government.—Meanwhile, in France, the number of poems in which fables about Reynard are set forth had mightily increased, but only the oldest among those which have survived (which only reach back to about the beginning of the 13th c.) display a pure epic character. In 1826 M. Méon published a collection, in 4 vols., of the stories extant in Norman-French, under the title of *Le Roman du Renart*, to which M. Chabaille, in 1835, added *Suppléments*, with various readings and corrections. The *Renart li Contrefet*, of an unknown poet of Champagne, has only been partially printed. From such sources sprung the French chap-books (*Volksbücher*), which came into vogue after the 15th century. How popular the fable became in France may be estimated from the fact that the German word reinhart (old form, *raginohart*—i.e., "bold" or "cunning in counsel"), which merely designates the character of the fox, has entirely superseded the old Franco-Latin word *goupil* (from the Latin *vulpes*). The Swabian court-poetry of Germany had little in harmony with the "beast-fable," which was little cultivated while the former continued to flourish. In the Netherlands, on the other hand, it continued to keep its ground, but as the mediæval spirit of poetry declined, it passed into prose—e.g., *De Hystorie van Reinaert de Vos*, published in Dutch at Gouda, in Holland, in 1479; which, in its turn, was translated into English in 1481 by William Caxton—*Hyer begynneth thystorye of Reynard the Foxe*; republished, with a few changes, by W. J. Thoms (Lond. 1844).—Thus have we sketched in meager outline the history of the fable of Reynard the fox in different countries, and from internal evidence it is clear that the substance of the Low-German *Reineke Vos* of Hinreck van Alckmer or Hermann Barkhusen was derived from the Flemish sources already referred to. Its peculiarity consists in this, that it is the latest, best, and most complete of the whole series of poems about the fox, gathering up into itself, as it were, whatever scattered merits its predecessors possess, and presenting the whole in epic unity for the pleasure and profit of all future ages. The work now consulted by general readers is Goethe's version, of which an excellent translation into English heroic verse was made by T. J. Arnold, with illustrations by J. Wolf (Lond. 1855). For a critical appreciation of the fable, see Carlyle's "Essay on German Literature of the Fourteenth and Fifteenth Centuries" (*Miscellaneous Essays*).

REYNOLDS, a co. in s.e. Missouri; drained by the Big Black river; about 650 sq.m.; pop. '70, 3,756—3,733 of American birth. The surface is hilly, and heavily wooded. The soil is fertile. Corn, wheat, and oats, are the principal productions. Co. seat, Centerville.

REYNOLDS, or RAINOLDS, JOHN, D.D; b. England, 1549; educated at Oxford; ordained, and in 1593 became dean of Lincoln; in 1598 was president of Corpus Christi college, Oxford. He was a man of vast learning, a great Hebraist, and made translations which he read to the king; and to him is due King James's version, he having urged upon the king the necessity of revising the Scriptures. He was a very copious writer.

REYNOLDS, JOHN FULTON, b. Penn.; graduated at West Point, 1841; distinguished himself at Monterey and Buena Vista, and, after the Mexican war, in Indian campaigns. Promoted for his services, he had attained the rank of lieut.col. at the beginning of the rebellion, and was then made brig.gen. of volunteers; was present at Mechanicsville and Gaines's Mill, and was captured. He was brevetted col. and brig.gen. for gallantry. After his release he commanded a division at Manassas, and at Fredericksburg led the 1st corps. He was killed at Gettysburg while leading the left wing of Meade's forces against Lee's army, leaving a high reputation as a soldier.

REYNOLDS, JOSEPH JONES, b. Ky., 1822; graduated at West Point, where he was assistant professor 1846–55. He was professor of mechanics in Washington university, St. Louis, 1856–60. He served through the rebellion, taking part in the campaign in West Virginia, and in the battles of the army of Cumberland. He commanded the department of Arkansas 1864–66, and was brevetted maj.gen U. S. army in 1867.

REYNOLDS, Sir JOSHUA, P.R.A., is generally acknowledged to be at the head of the English school of painting; he was b. on July 16, 1723. His father was the rev. Samuel Reynolds, rector of Plympton, St. Mary, and master of the grammar school of Plympton, Devonshire. He intended his son for the medical profession, but Joshua having manifested from an early age an ardent desire to be a painter, was, in 1741, placed under Hudson, the principal portrait-painter of the day. After being in the studio of this artist two years he commenced on his own account as a portrait-painter at Plymouth dock, now Devonport, and met with great encouragement. In 1746 he went to London and established himself in St. Martin's lane; but on the appointment of commodore Keppel to the Mediterranean station, he accepted an invitation to accompany him, sailed from Plymouth in 1749, and on his arrival in Leghorn, proceeded to Rome. He remained about three years in Italy, most diligently employing his time in visiting the various cities where the chief art-collections are to be found. On his returning to London in Oct., 1752, his works attracted great attention, eclipsing everything that had been done there since Van Dyck's time. When the royal academy was instituted in 1769 he was elected president; was knighted by George III., and on Ramsay's death, in 1784, succeeded him as painter to the king. He died in his house in Leicester square on Feb. 23, 1792, and after lying in state at the royal academy, was interred in the crypt of St. Paul's. Sir Joshua lived in friendly intercourse with Johnson, Burke, and the leading men of his period. His literary works consist of fifteen discourses delivered in the royal academy; three essays contributed to the *Idler*, at Dr. Johnson's request; notes to Mason's translation of Du Fresnoy's *Art of Painting;* a few notes for Dr. Johnson's edition of Shakespeare; and notes of his tour through Flanders in 1781. In his writings, there is much valuable information on art, imparted in an admirable manner; but he has been charged with laying down in them various rules and holding up the works of certain schools as models for the student, while he himself did not carry out these precepts in his practice as an artist; and from this an unfair inference has been drawn, that from love of gain he cultivated portrait-painting the most lucrative branch of the profession, and recommended others to follow what is generally believed to be a more arduous but less remunerative path of art. But this accusation is most unjustly made—perhaps no other artist has handed down in writing so many practically useful maxims and observations on art. His works of this kind fortunately are numerous and bear a very high value. There are nearly 700 engravings from Reynolds's pictures; most of them admirably rendered in mezzotint.—Northcote's *Life of Sir Joshua Reynolds* (2 vols. 8 vo, Lond. 1819); Cunningham's *Lives of British Painters, Sculptors, and Architects* (Lond. 1854, vol. 1).

RHAB'DOMANCY. See DIVINING-ROD.

RHADAM'ANTHUS, a mythical personage, son of Zeus and Europa, and brother of Minos (q.v.). He settled in Bœotia, where he married Alcmene, So great was his reputation during life for the exercise of justice, that after death he was appointed a judge in the under-world, along with Minos and Æacus. His special function was to sit in judgment on the actions of all those who came to Hades from Asia.

RHÆTIA, a Roman province of Europe lying on the Alps, n. of Italy and e. of Helvetia, and probably bounded n. by Vindelicia, thus corresponding to parts of the modern Tyrol, the Grisons and Lombardy. The Athesis and Œnus (mod. Adige and Inn) were the principal rivers. The natives were chiefly engaged in herding sheep and cattle. They were a hardy and warlike race; but were conquered about B.C. 15 by the Romans under Tiberius and Drusus. What was known as Western Illyricum and Vindelicia were united in the province Rhætia. The chief town was Tridentum or Trent.

RHÆTIC BEDS, a series of strata forming the uppermost portion of the trias (q.v.), which are extensively developed in the Rhætian Alps. The British beds referred to this group are more highly fossiliferous than any of the other members of the triassic period.

RHAMNA'CEÆ, a natural order of exogenous plants, consisting of trees or shrubs; often spiny; with simple, generally alternate leaves, and stipules minute or wanting. The flowers are small, generally green. The calyx is 4-5 cleft; the petals distinct, hood-shaped, or convolute, inserted into the throat of the calyx, occasionally wanting. The stamens are equal in number to the petals, and opposite to them; the disk is fleshy; the ovary is superior, or half superior, with two, three, or four cells; the ovules solitary. The fruit is fleshy, and does not open when ripe, or dry and separating into three parts. This order contains about 250 known species, natives of temperate and tropical countries, and very generally distributed over the globe. Some of them are used in dyeing (see BUCKTHORN and FRENCH BERRIES), some in medicine (see RED ROOT), and the fruit of some is pleasant (see JUJUBE); while *hovenia dulcis*, a native of China and Japan, is remarkable for the thickening of its flower-stalks after flowering, so as to form a succulent sweet red pulp, with a flavor resembling that of a pear.

RHAMPHASTI'DÆ. See TOUCAN, *ante*.

RHAMPSINITUS, the Greek name of the Egyptian monarch Rameses III., first king of the 20th dynasty, and builder of the great palace at Medinat Habu. According to Herodotus, he placed two colossal statues of 25 cubits high in front of the w. vestibule of the Hephæsteum at Memphis. He was the richest of Egyptian kings, having amassed 400,000 talents, or £77,500,000—an incredible sum for that period. This wealth was, however, probably in jewels as well as the precious metals, for both are recorded on the walls of the treasury of Medinat Habu. To secure this enormous treasure he built a treasury of stone, one side of which adjoined the wall of his palace. In connection with this is narrated a story which rather resembles the tale of Ali Baba in the *Arabian Nights* than the sober narrative of history. The story was told by the Egyptian dragomen of the days of the Persians to the father of history, who naively doubts its veracity; but notwithstanding some of the German researches which attempt to connect it with Hellenic myths of the brothers Agamedes and Trophonios, it is believed to be essentially Egyptian. Rhampsinitus is said to have descended to Hades, and to have played at drafts with Isis, or Ceres, and he is so represented on the walls of his palace at Medinat Habu. His return was celebrated as a festival. Herodotus, who has inverted and confused the whole history of Egypt, calls Rhampsinitus the son of Proteus, and predecessor of Cheops, placing him 16 dynasties earlier than he should be. According to Lepsius, he reigned about 1275 B C. According to Diodorus, Rhampsinitus was called Remphis, or rather Rempsis (Ramses), and by Pliny Ramses, in whose reign Troy was taken.

Pliny *Hist. Nat.*, xxxvi. 8, 14, 2; Herodotus, ii. 121–24; Diodorus, i. 62; Champollion, *Not. Descr.*; Burton, *Exa. Hier.*; sir G. Wilkinson, *Manners and Customs*, i. p. 121, and foll.; Lepsius, *Einleit.* p. 299, and foll.

RHAPSODISTS (from Gr. *rhapto*, to string together, and *odē*, a song), in ancient Greece, were a class of persons who earned their bread by going about from place to place, reciting, in a sort of musical chant, the epic ballads of Homer and other ancient poets. They may be compared with the wandering minstrels of the middle ages; but there is this important difference, that the latter were generally the authors of the compositions which they sung. The rhapsodists were long a respected and venerated body, but lost their importance, and consequently their character, when the Homeric songs after being written down and perhaps woven together into their present form by the scholars at the court of Peisistratos, became generally known to the Greek world through the medium of manuscript copies. Each ballad, or at least as much as could conveniently be remembered and recited at one time, was termed a "rhapsody," whence the application of the term to the separate books of the *Iliad* and *Odyssey*, in which usage it is equivalent to the *Fytte* or *Canto* of Scott and Byron.

RHATANY ROOT. See RATTANY ROOT.

RHE'A. See NANDU.

RHÉA, a co. in e. Tennessee, having the Tennessee river for its e. and s.e. boundary; 450 sq.m.; pop. '80, 7,073—7,044 of American birth, 773 colored. Its surface is level in the e. and mountainous in the w., where it forms part of the Cumberland mountains, and is there mostly covered with forests of oak and hickory. Its soil is fertile, and adapted to the raising of corn, wheat, oats, tobacco, sorghum, dairy products, and live stock. Its mineral products are bituminous coal and iron ore. Among its manufactories are wool carding, cloth dressing mills, and shoe factories. Co. seat, Washington.

RHEEA FIBER, an exceedingly valuable East Indian fibrous material, produced by one of the nettle tribe, *urtica tenacissima*, found indigenous in Assam. It is very nearly like the fiber of which the Chinese make their celebrated *grass cloth*, or linen, and excepting that there are at present some difficulties in preparing it, it would at once become one of the most useful and most abundant of textile fibers; large quantities have already been imported into Britain, and it is gradually getting into use.

RHEGIUM. See REGGIO (in the province of Reggio).

RHEIMS, or REIMS, a city and archiepiscopal see in the department of Marne, France, situated on the Vesle (a tributary of the Aisne), 107 m. e.n.e. of Paris, by the Paris and Strasburg railway. Rheims a very ancient city, is built on the site of *Durocortorum*, which is mentioned by Julius Cæsar (*De Bello Gallico*, vi. 44) as the capital of the Remi, from which people it subsequently took its present name. Christianity may have found an entrance into Rheims at an earlier period, but it was not till the middle of the 4th c. that it became a bishop's see. Under the Frank rule it was a place of much importance, and it acquired a deeply religious interest from its having been the scene of the baptism of Clovis and his chief officers by the bishop, St. Remy, in 496. In the 8th c., it became an archbishopric, and from the 12th c. (in 1179, in which year Philip Augustus was there solemnly crowned), it became the place for the coronation of the kings of France down to the time of Charles X., a vessel of sacred oil, called *la sainte ampoule*, to which a miraculous origin was ascribed, being preserved for the purpose. The only sovereigns in the long series down to the revolution of 1830 not crowned at Rheims were Henry IV., Napoleon I., and Louis XVIII. During the frenzy of the revolution, the cathedral was attacked by the populace, and the sainte ampoule destroyed in detestation of royalty; and in 1830 the ceremony of coronation at Rheims was abolished. Rheims is one of the principal entrepôts for the wines of Champagne, and the hills which surround the town are planted with vineyards. It is one of the great centers of the woolen manufacture in France, and its manufactures, embracing woolen goods, mixed fabrics in silk and wool, merinoes, etc., are known in commerce as *articles de Reims*. The town is well built, and from the material employed in building, which is the chalk-stone of the district, and from the prevalence of the older style of domestic architecture, has a picturesque appearance. Its most striking public building is the cathedral, which, although it still wants the towers of the original design, is one of the finest extant specimens of Gothic architecture. It was built in the first half of the 13th century. Its nave is 466 ft. long by 99 in breadth, with a transept of 160 ft., and the height is 144 ft. Its grandest features are the western front, which is almost unrivaled, and the so-called angel tower, which rises 59 ft. above the lofty roof. The stained glass is remarkable for its beauty; the baptismal fonts also are of exquisite workmanship, and the organ is reputed one of the finest in France. The church of St. Remy is of greater age, and nearly of equal size, but it is of less architectural pretension. The archiepiscopal province of Rheims comprises the sees of Soissons, Chalons, Beauvais, and Amiens. Pop. '76, 80,098.

RHEINGAU, a district stretching along the right bank of the Rhine, formerly belonging to the archbishopric of Mainz, now forms the administrative district of Wiesbaden, in the Prussian province of Hessen-Nassau. Rheingau is about 12 m. long, and 6 broad. This district, one of the richest in Germany, protected by mountains from the n. and e. winds, and exposed to the mid-day sun, produces wines of the best quality.

RHEIN-HESSE. See Hesse-Darmstadt.

RHENISH ARCHITECTURE, the style of the countries bordering on the Rhine when the arts first revived after the fall of the Roman empire. Being, at the time of Charlemagne, part of the same empire with Lombardy, the arts of that country (see Lombard Architecture) soon spread northward, and similar buildings sprung up n. of the Alps. There are almost no traces of architecture in Germany before the time of Charlemagne. It received great encouragement from him and his successors, and the Rhenish style made great progress up to the beginning of the 13th c., when the fashion of copying the Gothic architecture of France superseded it. It is, however, a well-marked style, and is complete and perfect in itself. Like the Lombard style, it is round-arched and has some remarkable peculiarities. The earliest churches seem to have been all circular (like the Dom at Aix-la-Chapelle, built by Charlemagne), and when this was abandoned, the circular church was absorbed into the basilica, or rectangular church (see Romamesque Architecture), in the form of a *western* apse. Most German churches thus have *two apses*—an eastern and a western. They also have a number of small circular or octagonal towers, which seem to be similar in origin to the round towers of Ireland. They exemplify in a remarkable manner the arrangements of an ancient plan of the 9th c., found in the monastery of St. Gall, and supposed to have been sent to the abbot, as a design for a perfect monastery, to aid him in carrying out his new buildings. The arcaded galleries at the eaves, and the richly-carved capitals, are among the most beautiful features of the style. Examples are very numerous from about 1000 to 1200 A.D. The three great types of the style are the cathedrals of Mainz, Worms, and Speyer. The last is a magnificent building, 485 ft. long by 125 ft. wide, with a nave 45 ft. wide and 105 ft. high. It is grand and simple, and one of the most impressive buildings in existence. There are also numerous fine examples of the style at Cologne—the Apostles' church, Sta Maria in Capitulo, and St. Martin's being amongst the most finished examples of Rhenish architecture. The peculiarities of plan and elevation above referred to are embodied in the church at Laach, which also has a paradise or pavis in front of the entrances. The vaults in this case being small, the different spans were managed (although with round arches) by stilting the springing; but in great buildings like Speyer and Worms the vaults are necessarily square in plan, in this round-arched style, and the nave embraces in each of its bays two arches of the side aisles—a method also followed by the early Gothic architects. From the use of the round arch and solid walls, the exteriors are free from the great mass of buttresses used in Gothic buildings, and the real forms are distinctly seen.

RHENISH CONFEDERATION. See Confederation of the Rhine, *ante*.

RHENISH PRUSSIA (Ger. *Rheinprovinz*, or *Rheinpreussen*), the most western and most thickly peopled of the provinces of Prussia, lies along the banks of the Rhine, and is bounded on the w. by Belgium and the Netherlands. Area 10,400 sq.m.; pop. '75, 3,804,381, of whom about 2,500,000 are Catholics, half-a-million are of Flemish blood, and 11,000 are Walloons. In the s., the surface is mountainous, the principal ranges being the Hundsrück, the Eifelgebirge, and branches of the Westerwald. The largest river is the Rhine, which flows through the province in a n.n.w. direction for 200 m., and receives many affluents from left and right. The surface is everywhere more or less mountainous, except in the extreme n., and the soil of the higher mountain-tracts barely supports the inhabitants; while that of the valleys of the Rhine, Moselle, and Nahe are very fruitful, and the flat districts in the n. are most productive in grain. Timber and minerals, including lead, copper, zinc, coal, etc., abound; and the warm and hot sulphur springs of Aix (q.v.) and Burtscheid (q.v.) have a European reputation. Industry and manufactures are here prosecuted with the utmost energy, and with great success. The cotton manufactures of the Wupperthal, the silk manufactures of Krefeld and vicinity, and the woolen cloth and Cashmere manufactures of the district of Aix, are famous. Rhenish Prussia came into the possession of Prussia by the treaty of Vienna in 1815. It consists of the former duchies of Cleves, Gelders, and Berg, of the principalities of Mörs and Lichtenberg, the northern and middle parts of the former archbishopric of Cologne, numerous lordships, portions from the four French departments of Rhein-Mosel, Mosel, des Forêts, and Saar, etc.

RHE'SUS MONKEY, *Macacus Rhesus*, an Indian monkey, extending further n. than any other species except the entellus (q.v.), or honuman, and, like it, partially migratory, visiting regions of the Himalaya in summer, which are far too cold for it in winter. It is held in almost as great veneration by the natives of India as the honuman itself; and the killing of one of these animals is apt to arouse the greatest popular indignation. The monkeys live in troops in the forests, chiefly in hilly districts, and visit the cultivated grounds to carry away grain and other produce, which they store up for themselves among rocks. The native farmers leave a share for the monkeys, believing this to be necessary for the averting of their anger, as otherwise, next year, they would destroy the whole crop whilst green. The rhesus monkey has a stout form, stout limbs, short ears, a short tail, large callosities, the skin hanging loose about the throat and belly, the hair rather long, the back brownish, the lower part of the back and the haunches bright chestnut, or almost orange, the shoulders and arms lighter. It is one of the most intelligent and mischievous of monkeys.

RHETORIC (Gr. *rhētorike*, from *rhētor*, an orator) in its broadest sense may be regarded as the theory of eloquence, whether spoken or written. It aims at expounding the rules which should govern all prose composition or speech designed to influence the judgments or the feelings of men, and therefore treats of everything that relates to beauty or force of style—e.g., accuracy of expression, the structure of periods, and figures of speech. But in a narrower sense rhetoric concerns itself with a consideration of the fundamental principles according to which particular discourses of an oratorical kind are composed. The three chief elements of an oration are usually held to be—*inventio*, or the discovery of proper ideas; *dispositio*, or their arrangement; and *elocutio*, or the style in which they are expressed. The ancients, however, who cultivated oral eloquence more than the moderns do, reckoned other two—viz., *memoria*, or memory, and *actio*, or gesticulation. The most distinguished writers on rhetoric in ancient times were Aristotle, Cicero, and Quinctilian; in modern times, Blair, Campbell, Whately, and Spalding among the English; Erneste Maass, Schott, Richter, and Falkmann among the Germans; and among the French, Rollin, Gibert, Le Batteux, La Harpe, Marmontel, and Andrieux.

RHEUMATISM (from the Gr. *rheuma*, a flux) is a blood-disease in which inflammation of the fibrous tissues is the most marked characteristic, It occurs either as an acute or as a chronic affection; there is, however, no distinct line of demarkation between the two, and the latter is often a consequence of the former.

Acute rheumatism is indicated by general febrile symptoms, redness, heat, swelling, and usually very intense pain, in and around one or more (generally several, either simultaneously or in succession) of the larger joints, and the disease shows a tendency to shift from joint to joint or to certain internal fibrous membranes, and especially the pericardium; rheumatism being the most common origin of pericarditis, as has been already shown in the article on that disease. The pulse is strong and full, there is headache, but seldom delirium, unless the heart is affected; the tongue is covered with a creamy thick fur, the tip and edges being red; the urine is turbid, and abnormally acid; and the skin is bathed in a copious perspiration, with so characteristic a smell (resembling that of sour milk), that the physician can often recognize the disease almost before he sees the patient. The joints are extremely painful, and the pain is much increased by pressure, and consequently by movement which gives rise to internal pressure. Hence the patient lies fixed in one position, from which he dares not stir. There are two varieties of acute rheumatism. In one, the inflammation commences not *in* the joint, but *near* it, and attacks the tendons, fasciæ, ligaments, and possibly the muscles themselves. This form is termed *fibrous* or *diffused* rheumatism. In the other variety, the synovial membrane in the joint becomes affected, and an excess of fluid is poured into the joint, distending the membrane, and making it bulge out between the spaces intervening between the various tendons, ligaments, etc., round the joint. It is the knee-joint which is most commonly affected in this way, and fluctuation may readily be perceived on applying the hands to the two sides of the knee. In this form, which is called *synovial* rheumatism, the swelling and redness come on sooner, and are more marked than in the former variety. The fibrous is by far the most severe form, and it is to it that the previous sketch of the most marked symptoms chiefly applies. In the synovial form, the fever is less intense, the tongue less foul, the perspiration far less profuse, and the membranes of the heart are much less liable to be attacked. It is to this form that the term *rheumatic gout* is often applied, and it is by no means inappropriate, because synovial rheumatism forms (as Dr. Watson has observed) a connecting link between gout and rheumatism, and partakes of the characters of both.

The only known exciting cause of acute rheumatism is exposure to cold, and especially to cold combined with moisture, and hence the greater prevalence of this disease among the poor and ill-clad. Sleeping in damp sheets or upon the damp ground, the wearing of wet clothes, and sitting in a cold damp room, especially if the sitter was previously warm from exercise, are examples of the kind of exposure which is apt to be followed by this disease. The excreting power of the skin being checked by the action of cold, certain effete matters which should be eliminated in the form of perspiration, are retained, and accumulate in the blood, which thus becomes poisoned. This blood-poisoning is not, however, a universal sequence to exposure to the cold. It only occurs when there is a special predisposition to this disease, or, as it is termed, a rheumatic diathesis or constitution, and the diathesis may be so strongly developed as to occasion an attack of acute rheumatism, independently of exposure to any apparent exciting cause. Men are more subject to the disease than women, but this probably arises from their greater exposure to atmospheric changes from the nature of their occupations. The predisposition is certainly affected by age; children under ten years, and adults over 60, being seldom attacked, while the disease is most prevalent between the age of 15 and 40. Persons once affected become more liable to the complaint than they previously were. Dr. Fuller believes, from his observations made in St. George's hospital, that the disease is sometimes hereditary; whether this be the case or not, there can be no possible doubt that the predisposition is very apt to exist in members of the same family. The exact nature of the poison is unknown. The late Dr. Prout regarded lactic acid as the actual *materies morbi*, and certain experiments recently made by Dr. Richardson tend to confirm this view.

The danger in cases of acute rheumatism arises almost entirely from the disease going from the joints to the heart, and setting up pericarditis (q.v.). Hence that mode of treatment will be best which tends most surely to prevent, or, at all events, to lessen the risk of this complication. If the patient is a young person of robust constitution, and there are well-marked inflammatory symptoms (such as a flushed face and a bounding pulse), he should be at once bled from the arm. A large quantity of blood can usually be taken before any signs of faintness occur, and the bleeding is serviceable in at least three points of view. In the first place, it almost always mitigates the pain, and diminishes the febrile symptoms; secondly, it enables other remedies, as calomel, opium, colchicum, etc., to act more efficiently; and thirdly, it may occasionally cut short the attack of the disease, which, if not arrested by treatment, may run on for six weeks, two months, or even longer. Unfortunately, however, the cases of rheumatism which are fit to bear free venesection are comparatively few, especially in large towns; and further, it often happens that the physician is not called in till the proper time for free depletion is past. Purging is probably almost as efficacious as blood-letting, at the beginning of the disease. From five grains to a scruple of calomel given every night, and followed in the morning, for three or four days in succession, by an ordinary black draught, will sometimes dislodge an enormous amount of dark and foul secretions from the liver and bowels, and give marked relief. The main drawback to this mode of treatment is the pain occasioned by changing the position when the bowels act; but this may be to a great extent obviated by the use of the bed-pan. Opium (or morphia) is one of the most valuable remedies in this disease, from its power of allaying pain and procuring sleep. Dr. Corrigan of Dublin trusts to opium alone for the cure. He begins with one grain, and repeats that quantity (or a larger one if necessary) at intervals of two hours, until the pain disappears. He found 12 grains in the 24 hours to be the average amount required; but half that quantity (or even less) will generally suffice, if the opium be combined with other remedies, as, for example, if it be given with ipecacuanha (as in Dover's powder), or with small doses of calomel. Colchicum sometimes has a marvelous effect in subduing the disease, but it must be given with extreme care, in consequence of the prostration to which an over-dose gives rise. See POISONS. Dr. Watson believes that this remedy is of most value when synovial symptoms are present, or when, in other words, the rheumatism approaches in its characters to gout. "Large doses," he observes, "are not requisite. Twenty minims of the wine or of the tincture may be given every six hours until some result is obtained." The abnormal acidity of the various fluids (the sweat, urine, and even the saliva) in acute rheumatism has led to the belief that alkaline remedies would both neutralize the poison, and, from their diuretic properties, tend to eliminate it. The bicarbonate of potash in solution has been largely tried by Dr. Garrod, who administered it in average doses of two scruples every two hours, by night and day, for several days together. Of 51 cases so treated the average period of treatment was between six and seven days, and the average duration of the disease was slightly under a fortnight. The medicine soon rendered the urine alkaline, but did not irritate either the bladder or the intestines. It seemed rapidly to calm the pulse and to allay the febrile heat; and in no case did any heart-complication arise after the patient had been 48 hours under its influence. Other physicians, including the late Dr. Golding Bird, prefer the acetate of potash. The mode of treatment by lemon-juice in doses of 1 or 2 oz. five or six times a day, originally advocated by Dr. G. O. Rees, at first sight seems in direct antagonism to the alkaline mode of treatment. As, however, the most active principle in the lemon-juice is citrate of potash, which, before it reaches the kidneys, becomes converted into carbonate of potash, there is less essential difference between the acid and the alkaline mode of treatment than at first sight seems to be the case. Some years ago a new and wholly different mode of treating acute rheumatism was warmly advocated by Dr. Davies of the London hospital. It mainly consists in the application of a series of blisters to the parts surrounding and adjacent to the affected joints. One of our highest authorities on this disease, Dr. Fuller of St. George's hospital, after trying various hot external applications, finds that a mixed alkaline and opiate solution is far more powerful than any other in allaying acute rheumatic pain. The solution which he now usually employs is made by dissolving half an ounce (or rather more) of carbonate of potash or soda in 9 oz. of hot water, and adding 6 fluid drams of Battley's *liquor opii sedativus*. Thin flannel, soaked in this hot lotion, is applied to the affected joints, and the whole is wrapped in a covering of thin gutta-percha.

Cases which are intermediate between acute and chronic rheumatism are of very common occurrence. In those cases of what may be termed *subacute* rheumatism there is slight fever, and several joints are usually affected, without intense inflammation in any one joint. These cases soon show signs of amendment under a mild alkaline treat ment, as, for example, a dram of liquor potassæ daily, well diluted and divided into three or four doses, and the moderate use of purgatives.

In all cases of acute and subacute rheumatism, the heart-sounds should be examined daily, or even oftener, with the view of detecting the earliest trace of cardiac affection, and, if possible, of checking its further development. For the treatment to be adopted when there is evidence that the membranes of the heart are affected, the reader is referred to pericarditis (q.v.).

There are two kinds of *chronic rheumatism*, which are sufficiently distinct to require notice. In one there is considerable local heat and swelling, although unaccompanied with any corresponding constitutional disturbance; while in the other the patient complains of coldness (rather than heat) and stiffness of the affected joints. The former approximates most closely to the previously described forms of rheumatism, of which it is frequently the sequel, and must be treated in a similar manner; while the latter, which is termed by some the *passive* form, usually occurs as an independent affection. In passive rheumatism the pain is relieved by friction, and the patients are most comfortable when warm in bed—conditions which increase the pain in the former variety. Patients of this kind derive benefit from living in a warm climate, from warm clothing, warm bathing, especially in salt water at a temperature of not less than 100°, the hot-air bath, etc. Friction with some stimulating liniment, and the peculiar manipulation known as shampooing, are here of service; and among the internal remedies, turpentine, cod-liver oil, sulphur, guaiacum, sarsaparilla, and Dover's powder possess a high reputation. Dr. Fuller recommends the muriate of ammonia as a remedy of "singular efficacy"; but of all remedies for this affection there can be little doubt that the most efficacious is the iodide of potassium, given in five-grain doses, combined with a few grains of carbonate of ammonia three times daily. A patient who is liable to attacks of chronic rheumatism should always wear flannel next the skin during the day, and at night he should sleep between the blankets, abjuring altogether the use of sheets.

RHEUMATIC DISEASES are less common in the lower animals than in men. Horses are not very liable to acute rheumatism, but suffer from a chronic variety, which occurs especially in conjunction with influenza. When affecting the limbs it often exhibits its characteristic tendency to shift from one part to another. In cattle and sheep rheumatic disorders are more common and acute than in horses. The specific inflammation sometimes involves most of the fibrous and fibro-serous textures throughout the body, inducing general stiffness, constipated bowels, and high fever. This is rheumatic fever—the chine-felon or body-garget of the old farriers. Sometimes the disease mainly affects the larger joints, causing intense pain, lameness, and hard swellings; occasionally it is confined to the feet and fetlocks, when it is recognized as bustian-foul. Cattle and sheep on bleak exposed pastures, and cows turned out of the dairy to feed on strong alluvial grazings, are especially subject to rheumatism in its several forms. Among dogs rheumatism is known under the name of kennel lameness, and is very troublesome and intractable in low, damp, cold situations. Blood-letting is rarely admissible except in the most acute cases among cattle. In all animals a laxative should at once be given with some saline matters and colchicum, and when the pain and fever are great, a little tincture of aconite may be added. For cattle, a good combination consists of 1 oz. of niter, 2 drams of powdered colchicum, and 2 fluid drams of the pharmacopœia tincture of aconite, repeated in water or gruel every three hours: half this dose will suffice for horses. With a simple laxative diet, dogs should have a pill night and morning containing five grains of niter and two of colchicum. Comfortable lodgings, a warm bed, horse-rugs on the body, and bandages on the legs, will greatly expedite a cure. In chronic cases, or after the more acute symptoms are subdued, an ounce of oil of turpentine, and two drams each of niter and powdered colchicum should be given for a cow, half that quantity for a horse, one-fourth for a sheep. Hartshorn and oil, or other stimulating embrocations, diligently and frequently rubbed in, will often abate the pain and swelling of the affected joints.

RHEYDT, a t. of Rhenish Prussia, on the left bank of the Niers, and on the railway between Düsseldorf and Aix-la-Chapelle, 14 m. w. by s. from Düsseldorf. It has manufactures of silks and velvets, soap, glue, vinegar, and leather; it has also dye-works, and some trade in linen. Pop. '75, 15,857.

RHIME. See RHYME.

RHINANTHUS, a genus of plants of the natural order *scrophulariaceæ*, having an inflated 4-toothed calyx; the upper lip of the corolla compressed laterally, furnished on both sides below the tip with a straight tooth or lobe, the lower one plain and 3-lobed. The capsule is compressed and 2-celled. *R. crista-galli* is a very common British plant, an annual, 1 to 2 ft. high, to be seen in almost every meadow and in many pastures, with yellow flowers, and rather large capsules, in which the seeds rattle when ripe, whence its common name, *yellow rattle*. It is also called cock's-comb, from its fringed bracts.

RHIN, BAS (LOWER RHINE), formerly a frontier department of France, and corresponding pretty nearly to the present German administrative district of Lower Alsace (*Nieder-Elsass*) in the imperial territory of Alsace-Lorraine. To the e. lies Baden, and to the w. are the French departments of Moselle, Meurthe, and Vosges. The area of Bas-Rhin, as a department of France, was 1759 sq.m., and its pop. in 1866 was 609,987; the area of Lower Alsace is 1841 sq.m., and its pop. in 1871, 600,406. This district lies almost wholly within the basin of the Rhine, which flows n. along its eastern border. The eastern portion of the district, lying along the left bank of the Rhine, consists wholly of plains; while in the w. are the rugged and wooded heights which form the eastern slopes of the Vosges mountains. In the hilly regions are many beautiful valleys. The winters are long and cold; the summer variable; the autumns always fine. Cretinism and goiter prevail in some parts, though to a less extent now than formerly. The country is unusually rich in agricultural and manufacturing resources and capabilities. A great variety of grains, fruits, and vegetables, including fine crops of hemp and tobacco, are grown extensively; and wines, red and white, the latter held in the highest estimation, are produced abundantly. Manufactures, textile and other, are carried on on a grand scale. Spinning-mills, weaving factories for cotton, calico, woolen, and other fabrics, are exceedingly numerous, and foundries, arms and machine factories also abound. Some timber, floated down the Rhine in rafts, is exported. The region recently occupied by the French departments of Haut-Rhin and Bas-Rhin constituted, prior to the treaty of Ryswick in 1697, one of the most densely peopled and industrious portions of Germany, called in German, Elsass (Lat. *Alsatia*). Ceded then to France, it became the French province of Alsace, which was at the revolution subdivided into the two departments. So it remained till, in 1870, during the war between France and Germany, Bas-Rhin and Haut-Rhin were, with portions of the departments of Moselle, Meurthe, and Vosges, erected by the king of Prussia into the German general government of Alsace. When peace was concluded at Frankfort, the repossessed German territory was not incorporated with any of the German states; but, certain portions having been restored to France, formed a member of the new German empire, with the title of the imperial territory (Reichsland) of Alsace-Lorraine (Elsass-Lothringen).

RHIN, HAUT (UPPER RHINE), formerly a frontier department in the e. of France, now for the most part comprehended within the German district of Upper Alsace. The area of Haut-Rhin was 1586 sq.m., and its population in 1866 was 530,285; the area of Upper Alsace being 1354 sq.m., and its pop. '71, 458,873. The eastern frontier is for the most part formed by the Rhine, and the western frontier by the Vosges mountains. After the Rhine, the principal river is the Ill, into which the streams from the Vosges mountains flow. In the middle of the district the soil is fertile, and of the valleys of the w. some are exceedingly rich and productive. The vineyards are extensive, and much wine is produced. In agriculture, and in trade and manufactures, great activity and enterprise are manifested. At the treaty of Frankfort, the cantons of Belfort, Delle, Giromagny, with 28 other communes, all formerly included in Haut-Rhin, were restored by Germany. The French remnant was then called "Territory of Belfort," but since 1878 is again Haut-Rhin.

RHINE (*Rhenus*), the most important river in Germany, and one of the most noted in Europe, takes its rise in the Swiss canton of the Grisons, and after a n.n.w. course of about 850 m., falls into the German ocean. The area of the Rhine basin, including its various feeders, which have been counted to the number of 12,000, is estimated at about 86,000 sq. miles. The Rhine is divided into the Upper, Middle, and Lower Rhine, the first of these terms being applied to the river from its source to Basel; the second applies to its course from Basel to Cologne; and the last to its course from Cologne through the Netherlands to the sea, into which it empties itself by several mouths, forming an extensive delta. The head-waters of the Upper Rhine consist of three main streams, called respectively the Vorder Rhine, the Mittler Rhine, and the Hinter Rhine. The first and most easterly rises on mount Crispalt, n.e. of mount St. Gothard, 7,500 ft. above the level of the sea, and flowing e., bursts like a torrent through a deep ravine. At Dissentis, 12 m. from its source, it is joined by the Mittler Rhine, or central branch, at the comparative low level of 3,500 feet. At Reichenau, 50 m. from the source of the Vorder Rhine, the stream is swelled by the third branch, known as the Hinter Rhine, which, taking its rise among the glaciers of the Vogelberg, flows over a distance of 80 m. before it blends its waters with the main branches. The Hinter Rhine, considerably the longest of the upper waters, claims to be esteemed the chief source, and at its confluence with the other branch at Reichenau, the river first assumes the general name of Rhine. At Coire, where the river takes a sudden turn northward, it is nearly 150 ft. wide, and navigable for rafts and flat boats. A little above the small town of Sargans, in St. Gall, it leaves the Grisons, and forming the boundary between the small principality of Lichtenstein and the Vorarlberg on the right, and St. Gall on the left, flows in a northerly direction to Rheineck, where it enters the Boden See, or lake of Constance, which may indeed be regarded as the river itself, augmented in its course between Rheineck and Constance by the confluence of numerous streams. Emerging from the upper lake at Constance, the Rhine enters the Unter See, or lower lake, a few m. below, and following a westerly course, forms the boundary-line between Switzerland and the grand duchy of Baden; and after receiving the Thur, Töss, and Aar on the left, and the mountain torrents of the Wutach and Alb on the right, pursues its course to Basel. At Schaffhausen, about 18 m. from the western extremity of the Unter See, the waters of the river, rushing over a rock 70 ft. high, form the cataract known as the falls of Schaffhausen; while lower down the narrowing of the channel through the projection of rocks on either side gives rise to rapids both at Laufenburg, and at a point 10 m. below it, known as Höllenhacken, where the navigation is impeded for a considerable distance by the force of the cataracts. Below Basel, the Rhine, turning again due n., separates Alsace-Lorraine from Baden, forms the eastern boundary of Rhenish Bavaria, cuts the province of Rhine-Hesse in two, and flows between Hessen-Nassau and Rhenish Prussia, through which it afterward pursues a n.w. course. Before it reaches Cologne, it takes up numerous tributaries and affluents, viz.: the Ill, Wiese, Elz, Kinzig, Murg, Neckar, Main, Lahn, Moselle, etc.; and passes the cities of Breisach, Strasburg, Germersheim, Spires, Mannheim, Worms, Oppenheim, Mainz, Bingen, Coblenz, and Bonn. In this middle part of its course, the river makes great bends, the current is rapid, and navigation is rendered difficult by numerous small islands and sand-banks, which are subject to changes of form and position. Much has been done to improve the Rhine above Bingen. By an agreement made in 1840, between France and Baden, it has been brought into its proper channel and considerably shortened. The valley through which the Rhine runs between steep banks from Mainz to Bonn, contains the picturesque scenery which has made this river so celebrated, and the vineyards from which the famous Rhenish wines are obtained. From Cologne to its mouths, the Rhine flows through a low level country, and soon after entering the Netherlands, divides it into two arms, the left, called the Waal, uniting with the Maas near Fort Loevestein, and forming the Merwede or Merwe, which below Dordrecht takes the name of the Old Maas; the right arm, called the Rhine, a little above Arnheim, throws off the New Yssel, originally a canal, cut by Drusus to connect the Rhine with the Old Yssel. Flowing on to Wijk bij Duurstede, the Rhine divides again into the Lek, which unites with the New Maas near Ysselmonde, and the Kromme Rhine, which at Utrecht parts into the Vecht and the Old Rhine, the latter as a small stream entering the North sea by the Katwijk canal to the n.w. of Leyden. The delta of the Rhine, which extends from about 51° 35′ to 52° 20′ n. lat., and occupies nearly 50,000 sq.m. of territory, belonging to the Dutch provinces of North and South Holland, Utrecht, and Guelderland, requires to be protected by strong embankments. The principal of these, which begin at Wesel, are about 25 or 30 ft. above the lowest level of the river. Several canals connect the Rhine with the Rhone and Saone, the Scheldt, Meuse, and Danube, and thus open a line of communication with France and Belgium on the one side, and with the Netherlands and every part of Germany on the other. The commerce and navigation of the Rhine, which are of vast extent and great importance, used to be regulated by treaties between the different states through which it passes, all of which levied tolls on vessels and goods entering their respective territories, and thus produced an accumulation of duties which pressed heavily on the transit trade. Steam-navigation is, however, conducted with greater regularity and energy on the Rhine than on any other river of Germany; and of late years, since the main lines of railway, running on either side of the river, have been connected by railway bridges across the river, additional importance and extension have been given to the commercial relations of all the countries connected with the Rhine. Pontoon or boat bridges cross the river at Cologne, Mainz, Mannheim, and a few other places.

RHINE, CONFEDERATION OF THE. See CONFEDERATION OF THE RHINE.

RHINE-WINE is a term of very general signification, applied, however, most frequently to those wines produced in the Rheingau (q.v.). The most valued and costly of these are the Schloss-Johannisberger, Hochheimer, Kloster-Erbacher, Rüdesheimer, Steinberger, Gräfenberger, Rauenthaler, Rothenberger, Scharlachberger, and Markobrunner. The red Rhine-wines, of which the Asmannshäuser is the most celebrated, are not nearly so much prized as the white; neither have they the strength or bouquet of the latter. The wines of the lower Rhine, from Düsseldorf downward, are generally of inferior quality.

The term Rhine-wine, in its general signification, includes the Pfalz and Moselle wines. It is now generally held in Germany that Rhine-wines that have been properly kept for 3 or 4 years are in the most wholesome condition for use; the very old stocks no longer find a ready market except in Russia and England.

RHINOCEROS (Gr. nose-horned), a genus of *pachydermata ordinaria*, containing the largest and most powerful of terrestrial mammalia, except the elephants. There are at least 7 or 8 existing species, all natives of the warm parts of Asia, the Indian archipelago, and Africa; and numerous fossil species have been discovered in the newest geological deposits. The form of the rhinoceros is clumsy and uncouth; its aspect dull and heavy. The limbs are thick and strong; each foot is terminated by three toes, which are covered with broad hoof-like nails. The tail is small, and terminated by a small tuft. The ears are moderately large; the eyes very small. The head is large, the muzzle prolonged, and the nasal bones combined into an arch for the support of a horn, which, however, does not spring from them, but merely from the skin; a second horn, in some of the species, growing above it, in like manner springing from the skin, and resting for support on the bone of the forehead. The upper lip is more or less prolonged and prehensile, in some of the species so much so that it is capable of being used to pick up very small objects. The whole body, head, and limbs are covered with an extremely thick and hard skin, which in none of the existing species exhibits more than mere traces of hair, although there is evidence that some of the extinct ones were covered with fur; and the hardness of the skin being such that in some of the species it has not pliancy enough to permit the movements of the animal, it is in a manner jointed by means of folds on the neck, behind the shoulders, in front of the thighs, and on the limbs.

The horn of the rhinoceros is a very remarkable organ, and a powerful weapon of offense and defense. With it also the animal can root up bushes or small trees, the foliage or fruit of which it desires to eat. It is of a perfectly homogeneous structure (see HORNS), and solid.

The different species of rhinoceros display some differences of dentition. None of the species displays a high degree of intelligence. Although usually harmless, they are easily provoked, and show much capriciousness of temper. When irritated they become very dangerous; and although usually slow in their movements, they can, upon occasion, run rapidly. Their great weight and strength enable them to force their way through jungles, breaking down the smaller trees before them. The hide is proof against the claws of the lion or tiger, and is not to be penetrated by a leaden bullet, except at a very short distance, or in some of the thinner parts about the neck and chest. Bullets of iron or tin are used for shooting them.

The species of rhinoceros agree in being found sometimes solitary or in pairs, sometimes in little companies, never in large herds.

The INDIAN RHINOCEROS (*R. Indicus*) is a native of the continental parts of the East Indies, and lives chiefly in marshy jungles on the banks of lakes and rivers, often wallowing in the mud, with which it encases itself, apparently as a protection against insects, which annoy it notwithstanding the thickness of its hide. It is the largest known species of rhinoceros, a large specimen being rather more than 5 ft. in height. The horn is sometimes 3 ft. in length, and 18 in. in circumference at the base. The Indian rhinoceros was known by very imperfect description to the ancient Greeks, receiving the very inappropriate name of *Indian ass;* and from accounts of it the fable of the unicorn probably originated. Individuals have from time to time been brought alive to Europe, and have proved tolerably quiet and tractable, feeding with apparent satisfaction on moistened hay, vegetables, pulse, grain, etc.—The JAVANESE RHINOCEROS (*R. Javanicus*, or *R. Sondaicus*) is a somewhat smaller species, also one-horned. Sumatra has a two-horned species (*R. Sumatrensis*).—Different species of rhinoceros, all two-horned, are found in almost all parts of Africa, and one or more of them were known to the ancient Romans.—The BOVELE, or BLACK RHINOCEROS (*R. bicornis* or *R. Africanus*), of south Africa, is the smallest of all the known species. It is of a black color, and its first horn is rather thick than long, its second short and conical. It is a fierce and dangerous animal, capable of great activity, and more dreaded by the south African hunter than the lion itself.—The KEITLOA (*R. keitloa*) is larger, and has the two horns nearly equal in length, the foremost horn curved backward the other curved forward. It is also a native of south Africa, and much dreaded both on account of its strength and its ferocity. —The WHITE RHINOCEROS (*R. simus*), or MUCHUCO, or MONOOHO, is the largest of the well ascertained African species.

No species of rhinoceros is prolific. One young one only is produced at a birth, and the intervals are long. The flesh of the rhinoceros is used for food. That of the different species is somewhat variously esteemed. The skin is used in the East Indies for shields; in south Africa it is sliced up into thongs.

The earliest remains of the rhinoceros are found in miocene strata, and in the subsequent tertiary deposits they frequently occur. Ten species have been described. A two-horned species was found by Pallas in the frozen gravel of Siberia, along with the mammoth, still covered with a shaggy coat of long wool, and having its flesh preserved.

RHINOPLASTIC OPERATION. When a portion or the whole of the nose has been destroyed by accident or disease, the deficiency may be restored by a transplantation of skin from an adjoining healthy part. When the whole nose has to be replaced, the following course is usually adopted. A triangular piece of leather is cut into the shape of the nose, and is extended on the forehead with its base uppermost; its boundaries, when thus flattened, are marked out on the skin with ink. Any remains of the old nose are then pared away, and a deep groove is cut round the margins of the nasal apertures. When the bleeding from these incisions has stopped, the marked portion of the skin of the forehead must be carefully dissected away, till it hangs by a narrow strip between the eyebrows. When the bleeding from the forehead ceases, the flap must be twisted on itself, so that the surface which was originally external may remain external in the new position, and its edges must be fastened with stitches into the grooves prepared for their reception. The nose thus made is supported with oiled lint, and well wrapped in flannel, to keep up the temperature. When complete adhesion has taken place, the twisted strip of skin may be cut through, or a little slip may be cut out of it, so that the surface may be uniformly smooth. When only a part of the nose, as one side only, or the septum, requires to be restored, modifications of the above operation are required, and the skin, instead of being taken from the forehead, is taken from the cheek or the upper lip. For further details regarding this important operation, the reader is referred to Fergusson's *Practical Surgery.*

This operation is popularly known as the *Taliacotian Operation*, from its having been first performed by Taliacotius, who was professor of anatomy and surgery at Bologna, where he died in 1553. The work in which the operation is described was not published for more than 40 years after his death. It appeared in 1597, under the title *De Curtorum Chirurgia per Insitionem libri duo.* Instead of taking the skin for the new nose from the forehead, he took it from the arm of his patient, and there is no reason why the operation which he describes, although inferior in many respects to that at present adopted, should not be successful. The difficulty of keeping the arm sufficiently long in apposition with the face (a period of about 20 days), was doubtless one of the reasons for selecting the forehead in preference as the part from which to take the skin. The name of Taliacotius has been mainly popularized in this country by a well-known coarse joke in Butler's *Hudibras.* There is, however, little foundation for the view which Butler takes of the operation. Taliacotius discusses the advantages and disadvantages of taking the skin from the *arm* (he does not suggest any other part of the body) of another person, but he comes to the conclusion that it would be impossible to keep two persons so fastened together for the necessary time, that no motion of the parts in apposition should occur, and he adds that he never heard of the plan being attempted. It is almost unnecessary to add that even if a nose were manufactured from the skin of a second person, there is not the slightest reason for apprehending that it would suddenly die and drop off on the death of the original proprietor of the skin, notwithstanding the cases to the contrary recorded, as illustrative of the power of sympathy, by Van Helmont, Campanella, sir Kenelm Digby, and others. This astounding notion was resuscitated not many years ago by M. Edmund About in a popular novel, entitled *Le Nez d'un Notaire.*

RHIPIPTERA. See STREPSIPTERA.

RHIZANTHEÆ (RHIZOGENS of Lindley) are a very remarkable natural order of plants. They are parasitical plants, brown, yellow, or purple, never of a green color, destitute of true leaves, and having cellular scales instead. The stem is amorphous and fungus-like: sometimes, as in rafflesia (q.v.), there is no stem; but the flowers arise immediately from the surface of the branch or stem to which the plant is parasitically attached. Spiral vessels are either few or wanting, and the substance is chiefly cellular tissue. While their general structure thus associates them with fungi, which they resemble also in their mode of decay, they have the flowers and sexual organs of phanerogamous plants. The flowers are monœcious, diœcious, or hermaphrodite. Lindley regards these plants as forming a class distinct from the other phanerogamous plants (*exogens* and *endogens*), and as one of the connecting links between them and the cryptogamous plants (*thallogens* and *acrogens*). There are not many more than 50 known species in all, of which one or two are found in the s. of Europe, the others in Africa and the warmer parts of Asia and America. *Cynomorium coccineum* (*balanophoraceæ*) is found in Malta, and is the *fungus melitensis* of apothecaries, long celebrated for arresting hemorrhages. Others are likewise used as styptics. *Cytinus hypocistis* (*cytinaceæ*) grows on the roots of species of cistus in the s. of Europe. Its extract (*succus hypocistidis*) is used as an astringent in hemorrhages and dysentery. A species of *ombrophytum* (*balanophoraceæ*) springs up suddenly after rain in Peru, like a fungus, is insipid, and is cooked and eaten under the name of *mays del monte.* Different species of *balanophora* are very abundant in northern India. They are found in the Himalaya at an elevation of 10,000 ft. producing great knots on the roots of maple trees, oaks, etc., which are sought after by the Thibetans, and carried into Thibet, where they are made into very beautiful cups.

RHIZOPODA (Gr. *rhizon*, a root, and *poda*, feet), an important class of the lowest of the animal subkingdoms, the protozoa. In all the organisms of this class, the body is composed of a simple gelatinous substance, to which the term "sarcode" is applied; and tion, all, locomotion is performed by the protrusion of processes which, from their func-
in are termed "pseudopodia," or false feet. As in the case of all the protozoa, except the infusoria, there is no mouth or intestinal tube.

As a typical form of rhizopod, the *amœba* a minute animal readily obtained in this country, may be taken. On placing one of these organisms (obtained from a pond, or from a bottle containing some vegetable infusion) under the microscope, it is seen to resemble a roundish mass of semi-transparent jelly, altogether devoid of life. Soon, however, the animal begins to push out in various directions portions of the gelatinous mass of which it consists, and by the alternate expansion and retraction of these prolongations it effects a slow and somewhat irregular locomotion. Should these processes come in contact with anything fit for food, they grasp it and coalesce around it, and the morsel soon becomes inclosed in the interior of the body, much as (to use an illustration employed by prof. Greene in his *Manual of the Protozoa*) a stone may be forced into the interior of a lump of clay, or similar plastic material. When all that is nourishing is absorbed, the indigestible remains are ejected through some part of the body. A nucleus may generally be observed, and at times (but not permanently) one or more clear vesicles may be noticed, containing a fluid which is apparently furnished during the process of digestion. The members of the genus *amœba* (containing at least three species) may be regarded as representing the simplest forms of animal life. Closely allied to the *amœba* is the *actinophrys*, or sun-animalcule, and both these genera are completely naked. In *difflugia* the "sarcode" is invested with a membranous oval coat with an aperture at one end, from which the pseudopodia project. In *ascella* the soft parts are protected by a discoid or hemispherical shield, open below; while in the *foraminifera* (q.v.), the soft part is invested with a calcareous shell, which is sometimes simple, but more commonly consists of an agglomeration of minute chambers.

Various classifications of the rhizopods have been proposed by different zoologists. That of Greene, in which they are simply divided into *amœbea* and *foraminifera*, is sufficient for all practical purposes. All the *amœbea* are microscopic, and seldom exceed $\frac{1}{50}$ of an inch in diameter. The *foraminifera* (q.v.) are somewhat larger.

Among the most important contributions to our knowledge of this department of the animal kingdom must be mentioned: Schultze, *Ueber den Organismus der Polythalamien*, 1854: Williamson, *On the Recent Foraminifera of Great Britain*, 1858; Claparede et Lachmann, *Etudes sur les Infusoires et les Rhizopodes*, 1858–60; Carpenter, *Introduction to the Study of the Foraminifera*, 1861; and Hackel, *Die Radiotarien*, 1862.

RHODE ISLAND, one of the 13 original United States of America, and the smallest in the union, on the southern coast of New England, is 47¼ m. from n. to s., and 37 m. from e. to w.; and has an area of 1306 sq. miles. It is bounded n. and e. by Massachusetts, s. by the Atlantic, and w. by Connecticut. It is divided into five counties, and its principal towns are Providence and Newport, the twin capitals; Bristol, Warren, Pawtucket, Woonsocket, etc. Narragansett bay, which occupies the south-eastern quarter of the state, is from 3 to 12 m. wide, and filled with beautiful islands, the largest of which, Rhode Island, is 15 m. long, by 3 to 3½ m. wide, and contains the town of Newport, a fashionable summer resort, with a large and spacious harbor, and formidable fortifications. Several small rivers, as the Pawtucket, Pawtuxet, Parocatuck, etc., rising in the hills of Massachusetts, flow into Narragansett bay, and their frequent falls afford water-power to numerous manufacturing villages. The country is hilly, and the soil rough and stony, and chiefly devoted to pasturage and orchards. The formation is chiefly of primary stratified and unstratified rocks, with some coal of a poor quality, iron, limestone, and marble. The climate is mild, and on the islands delightful. The population is chiefly engaged in trade and manufactures. There are in the state 142 cotton, 65 woolen, 26 iron factories; and a large coasting-trade and considerable fisheries are carried on. There are several railways. The state debt in 1878 was 2,484,500 dollars; the receipts for the year 1877–78 were 832,980 dollars. There are 62 national banks and 37 savings-banks, 6 daily and 19 weekly newspapers, about 300 churches, over 700 schools with 40,000 pupils, Brown university, and state penitentiary and asylums (see PROVIDENCE). The government, which existed until 1842 under the charter given to Roger Williams in 1642, is similar to that of the other states. The governor has a salary of 1000 dollars, or about £200, and the lieutenant-governor 500 dollars, or £100 per annum. Rhode Island is believed to have been the Vinland of the Norsemen, who explored this coast in the 10th century. It was settled in 1636 by Roger Williams and his companions, Baptists, who expelled for their religious opinions from the Puritan colony of Plymouth. The colony suffered from the Indian wars, until the defeat and death of Philip, king of the Wampanoags. Pop. in 1820, 83,059; 1840, 108,830; 1860, 174,621; 1870, 217,353, of whom 4,980 were colored; 1875, 258,239.

RHODE ISLAND (*ante*). After establishing a settlement at Providence (so-called in grateful acknowledgment of "God's merciful providence to him in his distress"), Roger Williams went to England in 1643 and obtained a patent that remained in force until 1663, when a charter was obtained from Charles II. incorporating the colony of "Rhode Island and Providence Plantations," which was the only constitution of government for 180 years. The colony was engaged in the great Indian war of 1675; then in the uprising against sir Edmund Andros; after which, during the following ninety years, it enjoyed prosperity and grew into prominence for its commerce and naval importance. In the war of the revolution the citizens of the colony were prominent both on sea and land, though it was the last of the thirteen colonies that accepted the constitution of the United States, its assent having been given on May 29, 1790. The soil of the state, though moderately fertile, is better adapted to grazing than to the cultivation of cereals, and the state has never had much importance in respect to its agricultural products. Nevertheless, in 1870, of the state's 675,000 acres of area, 502,308 acres were farms, and 289,030 acres were under cultivation. The productions were 784 bushels of wheat, 20,214 of rye, 311,957 of Indian corn, 157,010 of oats, 33,559 of barley, 1,444 of buckwheat, 9,920 of peas and beans, 669,408 of potatoes, 1,938 of grass seed, 796 lbs. of tobacco, 77,328 of wool, 941,199 of butter, 81,976 of cheese, 6,290 of honey, 765 gallons of wine, 1,944,044 of milk sold, and 89,045 tons of hay. The live stock on farms included, 7,770 horses, 18,806 milch cows, 5,821 working oxen, 9,748 other cattle, 23,938 sheep, and 14,607 swine. The crops of cereals are never large enough for the home consumption. But in the amount of manufactured products the state ranks tenth in the union. In 1870 nearly one-fourth of the entire population was employed in manufactories, and the annual product of the mills was about $530 to each inhabitant. There were 1850 establishments, employing 28,804 men, 14,752 women, and 5,861 children. The capital invested was estimated at $66,557,322; raw material used, $73,154,109; and the annual product, $111,418,354. Providence has extensive manufactures of machinery, steam-engines, screws, nails, jewelry, silver and plated wares, cigars, furniture, wire-goods, cotton and woolen goods, stoves, small wares, and chemicals, and is the leading market for print-cloths in the United States. Pawtucket has equally varied industries, and the whole region is thickly settled with manufacturing villages. The commerce of the state is chiefly domestic. Providence receives large quantities of coal and cotton for the neighboring states, as well as for the home supply, and ships manufactured goods. Much merchandise is also landed and shipped at this point for the Boston trade. The customs districts are Providence, Newport, and Bristol and Warren. For the year 1875 the imports amounted to $314,700 and the exports to $39,820.

Among the important railroads passing through the state are the Boston and Providence, New York, Providence and Boston, Old Colony, Providence and Worcester, and Providence and Springfield. In 1876 the total number of miles of track within the state was 220. The national banks in the state in 1875 numbered 62, with an aggregate capital of $20,504,800 paid in; state banks in operation, 15, with capital amounting to $5,091,697; and savings-banks, 38, with $51,311,330 on deposit. Of the insurance companies, there were at the beginning of 1876, 6 joint-stock and 18 mutual fire-insurance companies. The first had a paid-up cash capital of $1,300,000; the others had cash assets to the amount of $1,226,207.

The assessed valuation of real estate in the state in 1870 was $132,876,581; of personal property, $111,402,273. The total taxation not national during the same year was $2,170,152, of which $489,253 was state and $1,680,899 town, city, etc. In 1879 the receipts of the treasury were $970,072, and the disbursements $703,211. The bonded debt of the state amounted to $2,534,500, or, with the deduction of an available sinking fund, to $1,832,462. The total amount of the sinking fund was $733,764, which was invested principally in securities of the city of Providence and of the United States government.

The public schools are supported by state, town, district, and other taxes; and are under the supervision of a board of education, a commissioner of public instruction, and city and town superintendents. In 1879, out of 49,562 children between the ages of five and fifteen, 32,798 were reported attending public schools; 4,874 attending Roman Catholic schools; and 1,782 attending private schools. Altogether there were 819 schools and 888 teachers. The number of school-houses was 446, and the estimated value of school property $2,654,148. The appropriation from the state amounted to $92,923; from the towns, $340,237; and from other sources about $84,000, making a total revenue of over $500,000. The higher institutions are a state normal school in Providence, which gives free tuition to all who intend to teach, and Brown university (q.v.). The newspapers and periodicals published include 6 daily papers, 19 weeklies, and 6 monthlies. The leading church organizations in 1870 were as follows: Baptist, 109; Congregational, 27; Episcopal, 42; Friends, 17; Methodist, 33; Roman Catholic, 22; Second Advent, 17; Unitarian, 4; and Universalist, 4.

The constitution of Rhode Island provides that voters, in addition to the ordinary qualification of residence and the usual exceptions of disqualification, must either have real estate of the value of $134 or property renting for not less than $7 a year, or must pay a tax of at least $1.00, or have done military duty during the year. The legislature consists of a senate of 36 members (1 from each town) and a house of representatives not exceeding 72 members. Two sessions are held annually, the principal one at Newport. and an adjourned one at Providence in October. The state elections are held annually, Under the apportionment of 1872 the state is entitled to two members of Congress and has 4 electoral votes. The electoral votes have been cast as follows: 1792, Washington and Adams, 4; 1796, Adams and Ellsworth, 4; 1800, Adams for president, 4, while the vote for vice-president was broken; 1804, Jefferson and Clinton, 4; 1808, Pinckney and King, 4; 1812, De Witt Clinton and Ingersoll, 4; 1816, Monroe and Tompkins, 4; 1820, Monroe and Tompkins, 4; 1824, John Quincy Adams and Calhoun, 4; 1828, John Quincy Adams and Rush, 4; 1832, Clay and Sergeant, 4; 1836, Van Buren and Johnson, 4; 1840, Harrison and Tyler, 4; 1844, Clay and Frelinghuysen, 4; 1848, Taylor and Fillmore, 4; 1852, Pierce and King, 4; 1856, Fremont and Dayton, 4; 1860, Lincoln and Hamlin, 4; 1864, Lincoln and Johnson; 1868, Grant and Colfax, 4; 1872, Grant and Wilson; 1876, Hayes and Wheeler, 4; 1880, Garfield and Arthur, 4.

RHODES, an island now belonging to Asiatic Turkey, and long an important, wealthy, and independent state of ancient Greece, in the Mediterranean, lies off the s.w. coast of Anatolia, from the nearest point of which it is distant about 12 miles. It is 45 m. long, and 20 m. in greatest breadth, and is traversed in the direction of its length—from n.e to s.w.—by a chain of mountains, which reach in mount Artemira (the former *Atabyros*) a height of 4,070 ft., and in mount Artamiti of near 6,000 feet. Pop. about 30,000, of whom 6,000 are Turks, 1000 are Jews, and the remainder Greeks. The mountains are covered with forests, the valleys are fertile, and the well-watered plains form rich and beautiful pasture-lands. Of all the islands in the Levant, Rhodes possesses the most beautiful and the most temperate climate. It produces oil, oranges, citrons, etc., and might raise in profusion most necessaries and luxuries. But owing to the insecurity and extortion from which the Rhodians have long suffered, agriculture is in a very depressed state; much fertile land lies waste, and the island does not even raise corn enough for its scanty population. A little marble is quarried. The harbors are neglected, and the trade is now inconsiderable.

Rhodes, the ancient *Rhodos*, was inhabited at a very early period. The Telchines, who are asserted by tradition to have been its most ancient inhabitants, are said to have migrated hither from Crete. It was not, however, until the immigration of a branch of the Doric race that the distinctive national character of the Rhodians became fixed. The first immigration of Dorians seems to have taken place before the Trojan war, for Rhodes is said to have sent nine ships to Troy under the leadership of the Heracleid Tlepolemus. Situated between the three ancient continents, a position highly favorable to the development of commercial enterprise, the Rhodians at an early period rose to great prosperity and affluence. Their three most ancient towns were Lindus, Ialysus, and Camirus, and they planted numerous colonies not only on the shores in their vicinity, but also on the coast of Lycia, Italy, Sicily, and Spain. At the end of the 5th c. B.C. they founded the city of Rhodes (q.v.); and, after this event, the history of the island is comprised in that of the city.

RHODES, an ancient and famous maritime city, capital of the island of the same name, and situated on the n.e. extremity of that island. Lat. of harbor 36° 26′ n., long., 28° 16′ east. The modern city, though scarcely one-fourth the size of the former one, has an imposing appearance. Its site is admirable, and it rises in the form of an amphitheater behind the fortified harbors, of which there are two, separated from each other by a narrow quay. At the entrance to the harbors stand the two large quadrangular towers of St. John and St. Michael. The harbors, however, are now neglected, and this once flourishing mart of the east is now comparatively desolate, and is no longer the seat of industry or active commerce. The town, overlooked by mosques and minarets, consists of ill-built houses and gloomy streets. The earthquakes of 1851, of 1856, and of 1863, as well as the frightful powder-explosion in 1856, caused by a flash of lightning, did much to devastate the town. By the powder-explosion, the church of St. John, built in 1500, and the great tower of the knights of St. John, were shattered, together with 300 houses, under the ruins of which 1000 townspeople lost their lives; and by the earthquake of 1863, 2,000 houses were destroyed, and many lives lost. The palace of the grand master is now in ruins, and the hospital of the knights now serves as a granary. Pop. about 20,000.

The city of Rhodes was founded in 408 B.C., and was built on a regular plan, the unity and harmony of its architecture being secured by the circumstance that the design of the whole was the work of one man. It was girt about by strong walls, surmounted by towers, and was provided with two excellent harbors. But it was remarkable for the number and excellence of its paintings, sculptures, and statues, as well as for the beauty and strength of its architecture. At the entrance of one of its ports stood a gigantic brazen statue of Helios, 70 cubits in height, and called the Colossus of Rhodes. Besides this statue, which is described as one of the seven wonders of the ancient world, 3,000 others, of which 100 were colossal, adorned the city. The capital of a fertile and flourishing island, and the great center of the commerce of the Mediterranean, Rhodes long enjoyed great prosperity. The arts were also prosecuted with assiduity, and intellectual activity manifested itself here long after it had declined in most parts of Greece. From the outbreak of the Peloponnesian war to the middle of the 4th c. B.C., Rhodes was alternately in league with Athens and in arms against that city. Like the rest of Greece, it submitted to the victorious Alexander, and received a Macedonian garrison; but on the death of Alexander, 323 B.C., the Rhodians rose upon and expelled the intruders. From this time to the overthrow of the Macedonian monarchy, Rhodes largely extended its territories, and rose to great commercial and naval importance. After the death of Cæsar, whose side the Rhodians had taken against Pompey in the civil war, they were defeated in a naval engagement by Cassius, who in 42 B.C. entered the city by force, massacred the hostile leaders, seized the public property, and rifled the temples. This visitation broke the power of Rhodes, but it long continued to maintain its *prestige* as a seat of learning. During several centuries Rhodes remained in the power of the Greek emperors. In 1310 the grand master of the knights of St. John of Jerusalem settled here, and here the brethren remained till the 16th century. (See JOHN, ST., KNIGHTS OF). Since this period, Rhodes has remained a possession of Turkey.

RHOD'IAN LAW is the earliest system of marine law known to history, said to be compiled by the Rhodians after they had by their commerce and naval victories obtained the sovereignty of the sea, about 900 years before the Christian era. Cicero refers to the Rhodians as illustrious for their naval discipline. The collection of marine institutions termed Rhodian laws is to be found in Vinnius, but their authenticity is doubted. Some say that the Romans adopted these laws during the first Punic war; others say that Justinian incorporated them with the Roman law. The leading points supposed to be borrowed from the Rhodian law relate to the shares of the officers and crew of a ship, the punishment of barratry and of plundering wrecks, and compensation payable to the heirs of mariners who lost their lives in the service of the vessel.

RHO'DIUM (symb. R., Rh, and Ro, according to different chemists; eq. 52—new system, 104—sp. gr. 12.1) is one of the metals of the platinum group. It is a white, very hard metal, resembling aluminium rather than silver. It fuses less easily than platinum. It is ductile and malleable when pure and after fusion, and insoluble in all acids; but when alloyed in small quantity with platinum, copper, bismuth, or lead, it dissolves with them in *aqua regia*. It usually forms about one-half per cent of the ore of platinum, from which it is extracted by a complicted process, for details of which we must refer to Deville and Debray's "Memoir on Platinum and its Ores," in the *Annales de Chimie et de Physique* for 1859. Two oxides, two sulphides, and three chlorides of rhodium have been obtained and examined by chemists. The sesquichloride unites with several soluble chlorides to form crystallizable double salts, which are of a rose color (whence the name rhodium, from the Gr. *rhodon*, a rose). An alloy of steel, with a small quantity of rhodium, is said to possess extremely valuable properties; and according to Deville, an alloy of 30 or more parts of rhodium with 70 of platinum, is easily worked, and is not attacked by aqua regia, and hence it forms an excellent material for crucibles. This metal was discovered in 1803 by Wollaston.

RHODORA, a shrub of the United States, the *rhodora canadensis*, placed by some botanists with the rhododendron, from which it differs in its deciduous leaves, and in the shape of the flower, the corolla being two-lipped. The shrub is from 1 to 3 ft. high, leaves oblong, revolute on the margin, pale, smooth, green above, lighter and downy beneath. The flowers are in terminal umbels, and commence to blossom before the budding of the leaves, in April. They are very showy, of a bright rose-purple color. There is a white-flowered variety. Rhodora grows in cool mountain woods, in moist, springy places, but thrives well in gardens.

RHODODENDRON (Gr. rose-tree), a genus of trees and shrubs of the natural order *ericeæ*, having 10 stamens, a very small calyx, a bell-shaped or somewhat funnel-shaped corolla, and a capsule splitting up through the dissepiments. The buds in this and nearly allied genera, as *azalea* (q.v.), are scaly and conical. The species are numerous; they have evergreen leaves, and many of them are of great beauty both in foliage and in flowers. A few small species are natives of continental Europe and of Siberia; but the greater number belong to the temperate parts of North America, and to the mountains of India. *R. maximum*, so designated when the far larger Indian species were unknown, is common in Britain as an ornamental shrub. It is a large shrub or small tree, which forms impenetrable thickets on many parts of the Alleghany mountains, and has a magnificent appearance when in flower. The leaves are large, oblong, acute, stalked, leathery, dark-green and shining above, rusty brown beneath. The flowers are large, in umbellate corymbs, varying in color from pale carmine to lilac. This species is quite hardy in Britain; as is also *R. ponticum*, a very similar species, with narrower and more pointed leaves, which are of the same color on both sides, a native of western Asia, and apparently also of the s. of Spain. *R. catawbiense*, a native of the southern parts of the Alleghanies, with large purple flowers; *R. Caucasicum*, the name of which indicates its origin; and *R. aboreum*, a native of Nepaul, with very dense heads of large scarlet flowers, and leaves 4 to 6 in. long, attaining in its native country a height of 30 or 40 ft., are also fine species, and well known. Most of the extremely numerous varieties now common in our gardens and shrubberies have been produced from them by hybridizing or otherwise.—Many splendid species of rhododendron have recently been discovered in the Himalaya, the Khasia hills, and other mountainous parts of India, by Dr. Hooker and others; and some of them have begun to be introduced into cultivation in Europe. It is impossible for us to notice more than a few. *R. Falconeri* is described as in foliage the most superb of all, the leaves being 18 or 19 in. long. It is a tree 30 to 50 ft. high, with leaves only at the extremities of the branches. It grows in eastern Nepaul at an altitude of 10,000 feet. *R. argenteum* has flowers 4½ in. long, and equally broad, clustered, and very beautiful. *R. Maddeni*, *R. Aucklandii*, *R. Edgeworthii*, and others, have white flowers. *R. Dalhousiæ* is remarkable as an epiphyte, growing on magnolias, laurels, and oaks. It is a slender shrub, bearing from 3 to 6 white lemon-scented bells, 4½ in. long, at the end of each branch. *R. Nuttalii* has fragrant white flowers, said to be larger than those of any other rhododendron. All these belong to the Himalaya. In more southern latitudes, as on the Neilgherry hills and on the mountains of Ceylon, *R. nobile* prevails, a timber tree 50 to 70 ft. high, every branch covered with a blaze of crimson flowers.—*R. Keysii* and *R. Thibandiense*, also natives of the n. of India, have flowers with nearly tubular corolla.—*R. ferrugineum* and *R. hirsutum* are small species, shrubs from 1 to 3 ft. in height, natives of the Alps, and among the finest ornaments of alpine scenery. They are called *alpenrose* (alpine rose) by the Germans. They are not easily cultivated in gardens. They have small carmine-colored flowers in umbellate clusters. The mountain slopes glow with their blossoms in July and August. The flora of the Himalaya contains a number of similar small species. *R. anthopogon* and *R. setosum*, dwarf shrubs with strongly-scented leaves, clothe the mountains in eastern Nepaul at an elevation of 12,000 ft. and upward, with a green mantle, brilliant with flowers in summer. *R. nivale* is the most alpine of woody plants, spreading its small woody branches close to the ground, at an elevation of 17,000 ft. in Sikkim. *R. lapponicum*, a procumbent shrub, with small flowers, grows as far n. as human settlements have reached in Europe, Asia, and America.—Some of the species of this genus possess narcotic properties. An oil obtained from the buds of *R. ferrugineum* and *R. hirsutum* is used by the inhabitants of the Alps, under the name *olio di marmotta*, as a remedy for pains in the joints, gout, and stone. *R. chrysanthum*, a low shrub, with golden yellow flowers, native of Siberia, is also used in gout and rheumatism. *R. cinnabarinum*, a Himalayan species, poisons goats which feed upon it, and when used for fuel causes inflammation of the face and eyes. But the flowers of *R. arboreum* are eaten in India, and Europeans make a pleasant jelly of them.

RHOMBUS. See PARALLELOGRAM.

RHONE (*Rhodanus* of the Romans), which takes its rise in the Swiss Alps, on the western side of mount St. Gothard, not far from the sources of the Rhine, is the only important French river which falls into the Mediterranean. Its entire length, from its origin to the gulf of Lyons at its embouchures, is 644 m. and the area of its river basin 28,000 sq. miles. The Rhone is, for its length, probably the most rapid river in the world. On issuing from its source it runs in a south-westerly direction through the canton of Valais, and after being swelled in its rapid course by the afflux of several tributaries, it takes a sudden turn to the n. near Martigny, and throws its waters into the lake of Geneva (q.v.). After issuing from the lake it takes up the turbid stream of the Arve, and, forcing its passage through a rocky gorge of the Jura chain, disappears below the rocks near fort l'Ecluse for a length of 300 ft., forming the subterranean channel known as *La Perte du Rhone*. At St. Génis the Rhone enters a less mountainous district, and passing beyond the Jura district, flows through a low valley to Lyons, where it receives the Saône. From Lyons it follows a southern direction past Vienne, Valence, Montêlimart, Avignon, and Arles, bifurcating near Beaucaire and Tarascon into two main streams, the Greater and the Lesser Rhone, which inclose the delta known as the Ile de la Camargue, and finally merge their waters with those of the Mediterranean. The most important affluents of the Rhone are, on the right, the Ain, Saône, Doubs, Ardèche, and Gard; on the left, the Arve, Isère, Drôme, and Durance. From Lyons southward the Rhone is easily navigable for good-sized vessels; but the up-navigation, owing to the rapid fall of the stream, and the sudden shifting of sand-banks, is attended with considerable difficulty, and is at times almost impracticable. On account of these and other obstructions, which are greatest near the mouths of the river, the communication with the Mediterranean is chiefly effected by means of canals, which, communicating with several shore-lakes, as l'Etang de Berre and others, open a passage between the sea at Port du Bouc and the river at Arles, and thus obviate the necessity of navigating round the delta. In its upper and middle course the Rhone presents beautiful and varied scenery, enriched with a luxuriant southern vegetation, including grapes of superior quality, from which some of the finest wines of France are obtained: but below Avignon it passes through a broad, arid tract of country, and is bounded by swampy banks. The great natural commercial advantages of the Rhone have been considerably extended by means of numerous canals, which, by joining it to the Seine, the Loire, and the Rhine, have connected it with the Atlantic and the German ocean.

RHONE, a small but important inland department of France, bounded on the n.w. and s. by the departments of Saône-et-Loire and Loire; area, 1077 sq.m.; pop. '76, 705,-181. It lies almost wholly in the basin of the Rhone, and its great affluent the Saône; its eastern boundary is formed by these rivers. The surface is almost entirely mountainous or hilly. Of the 689,536 acres, more than one-half is under tillage. The principal productions are vines and mulberry-trees. The wines are famous for their excellent quality. Of the Mâcon wines, grown in the n., in the former district of Beaujolais, the best are the fine red wines of Chenas; of those grown in the s. of the department, called the *vins du Rhone*, the finest are the red wines of Côte Rôtie and the white wines of Condrieu. About 75,000 acres are in vineyards, and the amount of wine made annually is about 17,000,000 gallons. Silks (see LYONS) are manufactured extensively, and numerous other branches of manufacture are actively carried on. The industries of the department are mentioned under the names of the towns. The department is divided into the two arrondissements of Lyons and Villefranche. Capital, Lyons (q.v.).

RHONE, BOUCHES DU. See BOUCHES-DU-RHONE.

RHUBARB, *Rheum*, a genus of plants of the natural order *polygoneæ*, closely allied to *rumex* (dock and sorrel), from which it differs in having nine stamens, three shield-like stigmas, and a three-winged achenium. The species, which are numerous, are large herbaceous plants, natives of the central regions of Asia, with strong, branching, almost fleshy roots; erect, thick, branching stems, sometimes 6 or 8 ft. high; the stems and branches while in the bud covered with large membranous sheaths. The leaves are large, stalked, entire, or lobed; the flowers are small, whitish or red, generally very numerous, in large loose panicles of many-flowered clusters. The roots are medicinal; but those of different species seem to possess their medicinal properties in very different degrees, or these properties are developed very variously in different soils and climates, or according to other circumstances not at all understood. It is not known what species of rhubarb yields the valued rhubarb of commerce, which comes from inland parts of China or Chinese Tartary. Some of it reaches Europe by way of Canton, but the best is brought through Russia. It is commonly known, however, in Britain as *Turkey rhubarb*, because it was formerly brought by way of Natolia. It is carefully examined at Kiachta by persons appointed by the Russian government, so that the superior quality of all that is permitted to enter the European market is secured. Rhubarb is sometimes cultivated for its root in Europe, but the produce, *French rhubarb* and *English rhubarb*, is very inferior to the rhubarb of the east, which it is often employed to adulterate. About 12 acres are devoted to the cultivation of rhubarb for its root near Banbury, in England, the species cultivated being *rheum rhaponticum;* but in France, besides this species, *R. undulatum* and *R. compactum* are employed. At Banbury the roots are taken up when three or four years old, and dried in drying-houses by a carefully regulated heat.

The leaf-stalks of rhubarb contain an agreeable mixture of citric and malic acids, and when young and tender are much used, like apples, for tarts or pies, and also for making a kind of preserve. For these purposes different kinds of rhubarb are now very extensively cultivated in Britain, and in other temperate and cold countries, although it is only since the beginning of the present century that this valuable addition has been made to the plants of our kitchen-gardens; the species previously introduced having been cultivated merely as objects of curiosity, or for the sake of their roots. A number of species have been introduced into cultivation for their leaf-stalks. *R. palmatum*, the first species known, and which was once believed to yield the Turkey rhubarb, has roundish green leaf-stalks and half-palmate leaves, with pinnatifid pointed lobes. Its stalks are very inferior to every other kind in our gardens, both in size and quality, and the appearance of the leaf is very different. The other cultivated kinds, *R. undulatum*, *R. rhaponticum*, and *R. hybridum*, with endless varieties produced by the art of the gardener, all have broad, heart-shaped, undivided leaves, and the leaf-stalks flattened and grooved on the upper side. The leaf stalks are often also of a reddish color, which in some of the finest varieties pervades their whole flesh. Rhubarb is propagated by seed, and the plants yield a crop in the second or third year, or by dividing the roots. It prefers a light rich soil; and the ground ought to be heavily manured every year. The plants are placed three or four feet apart, according to the size of the variety. The varieties which, by excessive manuring, are made to produce the most gigantic stalks, are not nearly so good in quality as the smaller kinds. Rhubarb is cultivated on a most extensive scale by market-gardeners. It is forced in winter and early spring by being placed in pots within houses, or by having pots inverted over it, and dung and straw heaped around; and forced rhubarb is more tender and delicate than that which grows in open air.

There are few subjects in the *materia medica* which are so enveloped in obscurity as rhubarb. Even the period of its introduction into medicine is uncertain, for the description given by Dioscorides of the drug which he designates *rheon* does not correspond with our rhubarb. It was probably introduced into Europe by the Arabian physicians, somewhat previous to the time of Avicenna, in whose writings the term *rewund* occurs —a name still used, with a slight alteration, for rhubarb by the Persians and Hindus. In the British pharmacopœia no attempt is made to determine the species of *rheum* used in medicine, and there can be no doubt that the roots of several species are usually to be found in the drug-market. According to the pharmacopœia, the root, deprived of its bark, is imported from "Chinese Thibet and Tartary." Little is known of the chemical composition of rhubarb root further than that it yields a yellow coloring matter termed *rhein* ($C_{20}H_8O_6$?), which is sparingly soluble in water, but dissolves freely in the alkalies, producing a reddish-brown liquid, from which the rhein may be precipitated in flakes on the addition of acetic acid. Rhubarb is very liable to adulteration; and if the adulterated rhubarb be in a state of powder, the detection of the fraud is very difficult.

Rhubarb may be briefly described as a cathartic, an astringent, and a tonic. As a cathartic it chiefly operates by increasing the muscular action of the intestines; and when the cathartic action is over, there is generally more or less constipation, arising, as is usually supposed, from the astringent action then coming into play. The appetite is also improved, and the digestive process rendered more active, by the action of this drug. It must not be forgotten that the coloring matter of rhubarb passes into the serum of the blood and the secretions; and urine rendered red by its absorption has not unfrequently been confounded with bloody urine by practitioners ignorant of the very different chemical reactions of rhein and the coloring matter of blood.

Rhubarb is one of the best aperients for general use in infancy, in consequence of the certainty of its action, and of its tonic and astringent properties, which are of much importance in the treatment of many infantile diseases, attended with imperfect digestion and irritation of the intestinal canal. In adults it is serviceable in chronic diarrhea and dysentery, when it is expedient to clean out the bowels. It is also a useful aperient in convalescence from exhausting disease, as being free from the risk of overacting; and for the same reason it is a useful medicine for persons who are constitutionally liable to over-purgation from trivial causes.

The officinal preparations are the *pulvis rhei compositus* (composed of powdered rhubarb, magnesia, and ginger, and popularly known as Gregory's powder or mixture—the average dose being a teaspoonful), the *pilula rhei composita* (a compound rhubarb-pill, composed of rhubarb, aloes, myrrh, hard soap, oil of peppermint, and treacle—the dose, as an aperient, being ten or fifteen grains), the *extractum rhei* (dose from five to ten grains), the *infusum rhei* (dose from two to four fluid-ounces), and the *tinctura rhei*, which is usually given in doses of about a dram, in association with other aperients.

RHUMB, or RHOMB (Lat. *rhombus*), a term introduced, according to Vitalis, into navigation by the Portuguese, and signifying at first a meridian, or especially the principal meridian of a map. It then came to signify any vertical circle, whether a meridian or not, and hence any point of the compass. A ship is therefore said to sail on a rhumb when its head is kept constantly directed to the same point of the compass. The rhumb-line thus crosses all meridians at the same angle, and corresponds exactly to what is known as the *loxodromic lines* (q.v.). In Mercator's chart, the rhumb-line is a straight line (though not so in nature); but it must be carefully noticed that equal portions of it on the chart do not indicate equal distances on the surface of the globe, the divisions which are lowest in latitude always representing the greatest distance, and *vice versâ*.

RHYME, or RHIME, is more properly, perhaps, written *rime*, as it does not seem to be derived from the Greek *rhythm*, but to be a native Teutonic word, from the same root, probably, as Ger. *reihe*, a row, verb *reihen*, to array; also *reihen*, a song or a chain-dance, of which *reim* may be only a variety. In Ang.-Sax., *rim-craeft*, meant the art of numbering; *riman*, to number; and thus *rime*, although a native Teutonic word, may ultimately be from the same Aryan root as the Greek *rhythm* (q.v.), which etymologists derive from *rheo*, to flow. In early English, rhime (and the same is true of Ger. *reim* and the other forms of the word in other northern tongues as well as in the Romanic) meant simply a poem, a numbered or versified piece (compare Lat. *numeri*, numbers = verses, versification); but it has now come to signify what is the most prominent mark of versification in all these tongues, namely, the recurrence of similar sounds at certain intervals. As there may be various degrees and kinds of resemblance between two syllables, there are different kinds of rhyme. When words begin with the same consonant, we have *alliteration* (q.v.), which was the prevalent form of rhyme in the earlier Teutonic poetry (e. g., Anglo-Saxon). In Spanish and Portuguese, there is a peculiar kind of rhyme called *assonance*, consisting in the coincidence of the vowels of the corresponding syllables, without regard to the consonants; this accords well with the character of these languages, which abound in full-toned vowels, but is ineffective in English and other languages in which consonants predominate. In its more usual sense, however, rhyme denotes correspondence in the final syllables of words, and is chiefly used to mark the ends of the lines or verses in poetry. Complete identity in all the parts of the syllables constitutes what the French call *rich* rhyme, as in mo*dèle*, fi*dèle*; beau*té*, san*té*. But although such rhymes are not only allowed but sought after in French, they are considered faulty in English, or rather as not true rhymes at all. No one thinks of making *deplore* rhyme with *explore*. Rhyming syllables in English must agree in so far, and differ in so far; *the vowel and what follows it—if anything follow it—must be the same in both; the articulation before the vowel must be different.* Thus, m*ark* rhymes with l*ark*, b*ark*, *ark*, but not with re*mark*. In the case of *mark* and *ark*, the absence of any initial articulation in the last of the two makes the necessary difference. As an example of rhyme where nothing follows the vowel, we may take be-*low*, which rhymes with fore-*go*, or with *O!* but not with *lo*. To make a perfect rhyme, it is necessary, besides, that the syllables be both accented; *free* and merr*ily* can hardly be said to rhyme. It is almost needless to remark, that rhyme depends on the sound, and not on the spelling. *Plough* and *enough* do not make a rhyme, nor *ease* and *decease*.

Such words as *roaring*, de-*ploring*, form *double* rhymes; and an-*nuity*, gra-*tuity*, *triple* rhimes. In double or triple rhymes, the first syllable must be accented, and the others ought to be unaccented, and to be completely identical. In the sacred Latin hymns of the middle ages, the rhymes are all double or triple. This was a necessity of the Latin language, in which the inflectional terminations are without accent, which throws the accent in most cases on the syllable next the last—do-*lorum*, vi-*rorum*; sup-*plicia*, con-*vicia*. Although rhymes occur chiefly between the end-syllables of different lines, they are not unfrequently used within the same line, especially in popular poetry:

> And then to see how ye're negleckit,
> How *huff'd*, and *cuff'd*, and disrespeckit.
> *Burns.*
>
> And ice mast-*high* came floating *by*.
> *Coleridge.*

(SEE LEONINE VERSES.)

When two successive lines rhyme, they form a *couplet;* three form a *triplet*. Often the lines rhyme alternately or at greater intervals, forming groups of four (*quatrains*) or more. A group of lines embracing all the varieties of meter and combinations of rhyme that occur in the piece, forms a section called a *stave*, sometimes a *stanza*, often, but improperly, a *verse*. In the days of acrostics (q.v.) and other conceits, it was the fashion to interlace rhymes in highly artificial systems; the most complex arrangements still current in English are the sonnet (q.v.) and the Spenserian (q.v.) stanza. Tennyson has accustomed the English ear to a quatrain, in which, instead of alternate rhimes, the first line rhymes with the fourth, and the second with the third.

It is a mistake to suppose that rhime is a mere ornament to versification. Besides being in itself a pleasing musical accord, it serves to mark the endings of the lines and other sections of the meter, and thus renders the rhythm (q.v.) more distinct and appreciable than the accents alone can do. So much is this the case, that in French, in which the accents are but feeble, meter without rhyme is so undistinguishable from prose, that blank verse has never obtained a footing, notwithstanding the war once waged by French scholars against rhymed versification. "The advantages of rhyme," says Guest (*English rhythms*), "have been felt so strongly, that no people have ever adopted an accentual rhythm without also adopting rhyme." The Greek and Latin meters of the classic period, depending upon time or quantity, and not upon accent, were able to dispense with the accessory of rhyme; but, as has been well observed by Trench (*Sacred Latin Poetry, Introduction*, 1864), even "the prosodic poetry of Greece and Rome was equally obliged to mark this (the division into sections or verses), though it did it in another way. Thus, had dactyls and spondees been allowed to be promiscuously used throughout the hexameter (q.v.) line, no satisfying token would have reached the ear to indicate the close of the verse; and if the hearer had once missed the termination of the line, it would have been almost impossible for him to recover it. But the fixed dactyl and spondee at the end of the line answer the same purpose of strongly marking the close, as does the rhyme in the accentuated verse; and in other meters, in like manner, licenses permitted in the beginning of the line are excluded at its close, the motives for this greater strictness being the same." It is chiefly, perhaps, from failing to satisfy this necessary condition, that modern unrhymed verse is found unsatisfactory, at least for popular poetry; and it may be doubted whether it is not owing to the classical prejudices of scholars that our common English blank verse got or maintained the hold it has.

The objection that rhyme was "the invention of a barbarous age, to set off wretched matter and lame meter," rests on ignorance of its real history. It cannot be considered as the exclusive invention of any particular people or age. It is something human, and universal as poetry or music—the result of the instinctive craving for well-marked recurrence and accord. The oldest poems of the Chinese, Indians, Arabians, etc., are rhymed; so are those of the Irish and Welsh. In the few fragments of the earliest Latin poetry that are extant, in which the meter was of an accentual, not quantitative kind, there is a manifest tendency to terminations of similar sound. This native tendency was overlaid for a time by the importation from Greece of the quantitative meters; yet even under the dominance of this exotic system, rhyming verses were not altogether unknown; Ovid especially shows a liking for them:

Quot cœlum stellas, tot habet tua Roma puellas;

and in the decline of classicality they become more common. At last, when learning began to decay under the irruptions of the northern nations, and a knowledge of the quantity of words—a thing in a great measure arbitrary, and requiring to be learned—to be lost, the native and more natural property of accent gradually reappeared as the ruling principle of Latin rhythm, and along with it the tendency to rhyme. It was in this new vehicle that the early Christian poets sought to convey their new ideas and aspirations. The rhymes were at first often rude, and not sustained throughout, as if lighted upon by chance. Distinct traces of the adoption of rhyme are to be seen as early as the hymns of Hilary (died 368), and the system attained its greatest perfection in the 12th and 18th centuries. In refutation of the common opinion, that the Latin hymnologists of the middle ages borrowed the art of rhyme from the Teutonic nations, Dr. Guest brings the conclusive fact, that no poem exists written in a Teutonic dialect with final rhyme before Otfried's *Evangely*, which was written in Frankish about 870. Alliteration had previously been the guiding principle of Teutonic rhythms; but after a struggle, which was longer protracted in England than on the continent, it was superseded by end-rhymes.—See Guest's *History of English Rhythms* (2 vols., Lond. 1838), where the whole subject is learnedly and elaborately treated; Trench's *Sacred Latin Poetry, Introduction* (Lond. 1864); F. Wolf, *Ueber die Lais Sequenzen, und Leiche* (Heid. 1841).

RHYMER, THOMAS THE. See THOMAS THE RHYMER, *ante*.

RHYNCHONELLA, a genus of brachiopodous mollusca, characterized by its trigonal acutely-beaked shell, the dorsal valve of which is elevated in front and depressed at the sides, and the ventral valve is flattened or hollowed along the center. The genus is represented by two living species, the one from the icy seas of the north, and the other from New Zealand. The shells of both are black. No less than 250 species of fossil shells have been referred to the genus. They occur in all formations from the lower Silurian upward.

RHYNCHOPH'ORA. See WEEVIL.

RHYNCHOPS. See SKIMMER.

RHYTHM (Gr. *rhythmos*, any motion, especially a regulated, recurring motion; hence, measured motion, time, number), in its widest sense, may be defined as measured or timed movement, regulated succession. It seems to be a necessity for man, if movements of any kind are to be sustained for a length of time, that some more or less strict law of interchange should regulate the succession of the parts. It is even believed that the ground of this necessity may be discovered in the structure and functions of the human body. See Bain, *The Senses and the Intellect*. More particularly, in order that a number of parts may constitute a whole, or, at all events, a pleasing whole, a certain relation or proportion must be felt to pervade them. When exemplified in the arrangement of matter into visible objects, as in sculpture, architecture, and other plastic arts, rhythm is usually called *symmetry*. Rhythm applied to the movements of the body produces the *dance*. "The rhythmical arrangement of sounds not articulated produces *music*, while from the like arrangement of articulate sounds we get the cadences of *prose* and the measures of *verse*. Verse may be defined as a succession of articulate sounds, regulated by a rhythm so definite that we can readily foresee the results which follow from its application. Rhythm is also met with in prose; but in the latter its range is so wide that we never can anticipate its flow, while the pleasure we derive from verse is founded on this very anticipation."

The rhythm of verse is marked in various ways. In Sanskrit, Greek, and Latin, during their classic periods, *quantity*, or the regulated succession of long and short syllables, was the distinguishing mark of verse. In the languages descended from these three ancient tongues, as well as in all the other Aryan languages, the rhythm depends upon *accent*. See METER. The recurrence of similar sounds, or *rhyme*, is also used, along with accent, to render certain points of the rhythm more distinct, as well as to embellish it. See RHYME.

RHYTHM, in music, the disposition of the notes of a musical composition in respect of time and measure. To rhythm, music is chiefly indebted for its order, perspicuity, intelligibility, and consequently its power and effect. The rhythmical value of a musical sound is the ratio which its duration bears to that of other sounds. See NOTE. A musical composition is made up of portions of equal rhythmic value, called *measures*, separated by vertical lines called bars, the length of the measure being indicated by a sign at the beginning of the movement. For the varities of time and their signatures, see MUSIC. The first note in each measure is distinguished by a greater force or stress than the rest; that stress is called *accent*, and of the four measure-notes in common time, the third has also a subordinate accent, as has the third measure-note in triple time. There is also an irregular or rhetorical accent in music called *emphasis*, which may be laid on any part of the measure, and whose use is regulated by taste and feeling.

RHYTHMICAL MENTAL DISEASES. Certain affections become aggravated or mitigated at particular hours; certain others appear in paroxysms, to a certain extent, of regular duration and recurrence; and a third class is named quotidian, quartan, etc., from the precise and unvarying periods at which their access returns. The element of time, and of regular intervals of time, is chiefly characteristic of morbid conditions of the nervous system. In chorea and involuntary shrieking, singing, etc., a rhythm may often be detected, of which the patient is altogether unconscious. Not merely have movements of the eyelids and of the limbs presented a perfectly timed succession, but cases are recorded where the wild gesticulations and jactations of St. Vitus's dance have been regulated so as to correspond to popular airs. A person has been known to strike his breast with the hand for hours with the same exactitude as if measured by a timepiece. Those affected with tarantism are prompted to dance by the sound of music; and their movements are determined, it is affirmed, not by volition, but by the cadences of the tunes played in their hearing. The victims of the dancing mania in the 15th c. were similarly affected. In many forms of insanity there is seen a tendency to rhyming in words, as well as to rhythmical movements. A patient for three consecutive days vociferated incessantly words terminating in *-ation*.—Laycock, *Nervous Diseases of Women*, pp. 185, 314; Sauvage, *Nosologia Methodica*, tomus ii., p. 231; *Medical Critic*, *passim*.

RHYTINA BOREALIS, a fish-like formed mammal, belonging to the order *sirenia*, now extinct. It was discovered in 1741, by the Russian naturalist Steller, on an island in Behring's strait. They were then abundant, but were killed by hunters of sea-otters. In about 30 years from their discovery they were exterminated. The mature animal was about 22 feet long, and was herbivorous, feeding principally on sea-plants.

RIAZAN', a central government of Great Russia, extends s.e. from the government of Moscow. Area, 16,221 sq. m.; pop. '70, 1,477,433. The principal river is the Oka, which, after forming the boundary between the governments of Moscow and Tula, and part of the boundary between Moscow and Riazan, flows s.e. to the middle of the latter, then turning n., disappears across the border on the n.e. The Oka divides the government into two unequal parts, of which the northern is low in surface and sandy in soil, while the southern presents an elevated surface and a most fertile soil. The Don crosses the s.w. part of Riazan, but is not here navigable. The chief products are iron ores, limestone, wheat, oats, rye, millet, buckwheat, and vegetables. There are many remarkably good studs. Though the chief occupations are agriculture and horticulture, there are a number of important industrial establishments, as needle, cloth, and glass factories; cotton-mills, iron-works, tanneries, and soap and tallow works. Manufactured goods and corn are exported.

RIAZAN, a t. of Great Russia, capital of the government of the same name, stands on a branch of the Oka, near its junction with that river, 130 m. s.e. of Moscow. It was founded in 1208, became in 1487 the residence of the princes of Riazan, and was made chief town of the government of Riazan in 1778. The chief fragment of antiquity is the interesting old fort called the Kreml. There is a ferry here across the Oka, at which the products of the vicinity are shipped; 5,770,000 bushels of corn are exported annually. Pop. '67, 17,950.

RIB, in architecture, a projecting band or molding on an arched or flat ceiling. It is of universal use in all styles of Gothic architecture; the early Norman examples are simple square bands crossing the vault at right angles, the groins being plain angles. In early English, the groins and ridge are also ribbed, and all the ribs are molded. The ribs and their moldings are multiplied as the style advances, till the whole surface becomes covered with them in the fan-tracery vaults (q.v.). Plaster ceilings are sometimes elaborately ornamented with patterns formed by ribs, especially in the styles of the times of Elizabeth and James I.

RIBAULT, JEAN, d. 1565; b. France; left Dieppe in 1562, in command of two vessels. Sailed along the Florida coast, and anchoring at Port Royal, built fort Charles, near the present Beaufort. He left 26 colonists, and returned to France, from which, on account of the civil wars, he was unable to return till 1565. Meanwhile the colony had been abandoned. A settlement of French Protestants had been made in 1564, on the May, now the St. John's river. Ribault came over with 7 vessels the next year, and assumed command of the colony. Soon after his arrival a Spanish squadron came with orders to kill all the Protestants in the settlement. Ribault at first went out to sea, but sailing for St. Augustine afterward to fight the Spaniards, was wrecked, and his whole squadron lost. Meanwhile Menendez had taken the fort on the May, and massacred 200 persons. Ribault, with 500 men, traveling toward the settlement, was surprised by Menendez, and with most of his party put to death.

RIBBON, in heraldry, a diminutive of the ordinary called the bend, of which it is one-eighth in width.

RIBBON. See SILK AND SILKWORM.

RIBBON-FISH, the popular name of a family of acanthopterous fishes called *tæniidæ*, or more properly, *tænioidæ*, by naturalists (from *tænia*, a tape-worm), on account of their compressed and elongated form. Notwithstanding their peculiarity of form, they are nearly allied to the *scomberidæ*, or mackerel family. They are of very delicate structure, with naked and silvery skin, a long dorsal fin often uniting with the tail-fin, a small mouth, and a protractile snout. They are widely distributed from polar to tropical seas, but are nowhere found in abundance, being deep-sea fishes, and mere occasional visitants of the coasts. Owing to the delicacy of their frame, perfect specimens are seldom obtained. Species exist which are nine or ten feet long, not six inches deep, and scarcely an inch thick. See BAND-FISH, DEALFISH, and GYMNETRUS.

RIBBONISM, the name of a system of secret associations among the lower classes in Ireland, the objects of which have long been a subject of much suspicion and of considerable controversy. The first origin of the associations known under this name is involved in much obscurity. From the middle of the last century, secret organizations, variously designated, but for the most part connected with agrarian discontent, have from time to time arisen in Ireland. The earliest of these appears to have been that of the Whiteboys, who appeared about the year 1759. Later in the century the fierce and sanguinary strife to which the relaxation of some of the penal laws under which the Catholics had long suffered gave occasion in the north, and which resulted in the Protestant organization already described under the head Orangemen (q.v.), led to the Catholic counter-organization known by the name of defenders; but this association seems to have been for the time purely local, being confined to Armagh and the neighboring counties, in which the violences of the Protestant party had originated. The severely repressive measures adopted by the government on the outbreak of the rebellion of 1798, and continued for several years, prevented any notable progress of the Catholic organization; and when at length, about 1806, such an organization was initiated, it was of necessity conducted with the utmost secrecy. The name by which the members of these associations were now known was "Threshers." They appeared chiefly in Sligo, Mayo, Leitrim, Longford, and Cavan; and it is worthy of note that one of their professed objects was to resist the payment of tithes, and even of the stipend commonly, although freely, paid to the Catholic priests by members of their congregations. The associations called (it is supposed from the badge worn by the members) by the name of ribbon societies first appeared about 1808, and originated in Armagh, whence they spread to Down, Antrim, Tyrone, and Fermanagh. There can be no doubt that their real object was a combined action, partly for self-defense, partly also probably for directly antagonistic action against the now wide-spread and formidable Orange confederacy. Their operations from the first were for the most part limited to the counties, chiefly in the n. and n.w., in which the Orange associations were sufficiently numerous to be formidable; nor do they appear at any time to have had a footing in the purely Catholic counties where there were few or no Orangemen to be encountered. The secret associations of the other districts—the midland, southern, and south-eastern counties—as the "Carders" in East and West Meath, in Roscommon, and part of Mayo; and the "Shanavests" and "Caravats" in Tipperary, Kilkenny, Cork, and Limerick, had little of the religious element in their organization, being mainly due to discontents arising from alleged agrarian and social grievances.

The ribbon association also, no doubt, addressed itself to the same agrarian and social grievances; but it is plain that its direct and immediate object was antagonism to the Orange confederation, to which, in some respects, it bore considerable resemblance, although it was deficient in that complete and wide-spread organization which so remarkably distinguished the former body. The ribbon association was divided, like the Orange, into lodges, and the members of each lodge were bound by a secret oath to "be true to each other," and "to assist each other in all things lawful." Stated meetings of the lodges were held, and small money contributions were exacted, both at entrance into the association, and on each occasion of meeting. The members, moreover, were known to each other by certain secret signs and pass-words, which were frequently changed, and some of the specimens of which were of a singularly absurd and ludicrous character. But there does not appear to have been anything like that complete and curious scheme of a "central grand lodge," with its subordinate hierarchy of "county," "district," and "private" lodges, which characterized the great rival confederation. A still more striking and important difference was in the class of men with which the ribbon societies were recruited. They are proved to have consisted exclusively of the very lowest classes, the humbler peasantry, farm-servants, and operatives of the least intelligent class. No trace appears among them of what is so striking in the Orange association—the co-operation, or even the countenance of the gentry, the clergy, the commercial class, hardly even of the farming class, except a few of the sons of farmers of the lowest grade. On the contrary, an attempt which was made, in a committee of the house of lords in 1839, to connect the Catholic clergy and the Catholics generally with the ribbon association, proved a signal failure, as did also the attempt to show that the objects of the association were the overthrow of British rule in Ireland; and it was proved that the Catholic clergy, from the first origin of these associations, have persistently opposed them, and employed all their influence, and even their spiritual authority, to deter their flocks from taking any part in them.

From the absence of all statistical information, and from the rude and illiterate material out of which alone these societies are formed, it is impossible to offer any estimate of their number or extent. That they still exist becomes abundantly clear on every occasion of party-strife which arises in Ireland; but they appear to have been replaced in several parts of the country by newer associations, such as the "Phenicians," the "Brotherhood of St. Patrick," and the "Fenians," an association which is said to possess large affiliations in America, and among the Irish in the manufacturing towns of England and Scotland. See FENIANS.

RIBEAUVILLE (Ger. *Rappoltsweiler*), a small manufacturing t. of Alsace, pleasantly situated amid vineyards, 34 m. s.s.w. of Strasburg. Excellent wines are made, and cotton goods are manufactured. The town is overlooked by the Vosges mountains, along the crests of which runs a wall or rampart, built of unhewn stones, without cement, and from 8 to 10 ft. high. It is of unknown antiquity, and is called the *heidenmauer*, or pagan wall. Pop. '75, 5,785.

RIBERA, JOSE, called SPAGNOLETTO ("the Little Spaniard") was b. at Xativa, near Valencia, in 1588, and died at Naples in 1656 or 1659. He studied a few years with Francesco Ribalta, a Spanish painter of eminence, but resolved to visit Italy; and after working hard at Rome, and studying the greatest masterpieces in some other states, he went to Naples, where, attracted by the novelty and boldness of Caravaggio's style, he adopted it, and became the ablest painter among the *naturalisti*, or artists whose treatment of subjects was based on a vigorous and powerful, but generally coarse and vulgar representation of nature, in opposition to that formed on the study of conventional or academic rules. He settled in Naples, where he became court-painter, and executed numerous important commissions in that city; and it is there that his best works are to be seen. Salvator Rosa and Guercino are numbered among his pupils. He executed about eighteen or twenty etchings, all marked by force and freedom.

RIB-GRASS. See PLANTAGINEÆ.

RIBS are elastic arches of bone, which, with the vertebral column behind, and the sternum or breast-bone in front, constitute the osseous part of the walls of the chest. In man, there are 12 ribs on each side. The first 7 are more directly connected through intervening cartilages with the sternum than the remainder, and hence they are termed *vertebro-sternal* or *true* ribs; while the other five are known as *false ribs*, and the last two of these, from being quite free at their anterior extremities, are termed *floating ribs*. A glance at a skeleton, or at a plate representing the articulated bones, will show that the ribs vary very considerably both in their direction and size. The upper ribs are nearly horizontal, but the others lie with the anterior extremity lower than the posterior; this obliquity increasing to the 9th rib, and then slightly decreasing. They increase in length from the first to the eighth, and then again diminish. The spaces between the ribs are termed the *intercostal spaces*. On examining a rib taken from about the middle of the series, we find that it presents two extremities (a posterior or vertebral, and an anterior or sternal), and an intervening portion, termed the body or shaft. The posterior extremity presents a head, a neck, and a tuberosity. The head is marked by two concave articular surfaces divided by a ridge, the lower facette being the larger. These surfaces fit into the cavity formed by the junction of two contiguous dorsal vertebræ, and the ridge serves for the attachment of a ligament. The neck is a flattened portion proceeding from the head; it is about an inch long, and terminates at an eminence termed the tuberosity or tubercle, from whence the shaft commences. On the lower surface of this tubercle is a small oval surface, which articulates with a corresponding surface on the upper part of the transverse process of the lower of the two contiguous vertebræ. The shaft presents an external convex, and an internal concave surface. A little in front of the tubercle, the rib is bent inward, and at the same time upward, the point where this bending takes place being called the angle. The upper border of the rib is thick and rounded, while the lower border is marked by a deep groove, which lodges the intercostal vessels and nerve.

The ribs of mammals are mostly connected, as in man, with the bodies of two vertebræ, and with the transverse processes of the posterior one. In the monotremata, however, they articulate with the vertebral bodies only; while in the cetacea, the posterior ribs hang down from the transverse processes alone. Their number, on each side, corresponds with that of the dorsal vertebræ. The greatest number, 23, occurs in the two-toed sloth, while in the cheiroptera, 11 is the ordinary number. In birds, each rib articulates by means of a small head with the body of a single vertebra near its anterior border, and with the corresponding transverse process by means of the tubercle. Moreover, each rib possesses a "diverging appendage," which projects backward over the next rib, so as to increase the consolidation of the thoracic framework, necessary for flying. The dorsal vertebræ here never exceed 11, and are commonly 7 or 8 in number, and the ribs proceeding from them are connected with the sternum, not by cartilage, as in mammals, but by true osseous sternal ribs, which are regularly articulated at one end with the sternum, and at the other with the termination of the spinal ribs. In the chelonian reptiles, the ribs (as well as the vertebra and the sternum) deviate remarkably from the normal type, the lateral parts of the carapace consisting mainly of anchylosed ribs united by dermal plates. In the crocodiles, there are only twelve pair of true or dorsal ribs; while in the other saurians, and in the ophidians, the ribs are usually very numerous. In the frogs, there are no true ribs; the reason probably being, that any bony element in their thoracic walls would interfere with the enormous thoracico-abdominal enlargement which these animals periodically undergo at the breeding period.

In the language of the transcendental anatomists, a rib is to be regarded as a *pleurapophysis*—one of the elements of a typical vertebra (q.v.).

RIBS, FRACTURE OF THE, is a very common surgical accident, resulting from blows or falls upon the chest. Ribs may, moreover, be broken by mere pressure, as when persons are severely crushed in a crowd; and instances are on record in which, in the case of aged persons, the ribs have been actually fractured in violent coughing.

The treatment consists in the application of a broad flannel roller around the chest, so tightly as to prevent, as far as possible, all movement of the ribs, and to render the respiration abdominal rather than thoracic. The bandage must be prevented from falling by the addition of shoulder-straps; and in order to prevent the shoulder-blade from moving, and thus disturbing the broken ribs, some surgeons confine the arms to the side of the body. If one or both of the extremities of the fractured rib should perforate both the pleuræ, and wound the lung, air escapes in the act of inspiration from the lung into the pleural cavity, and from thence through the wound in the costal pleura into the cellular or areolar tissue of the trunk, giving rise to *emphysema*, in the form of a soft puffy tumor, that crepitates and disappears on pressure.

RICARDO, DAVID, a political economist and statesman, was b. in London on the 19th of April, 1772. He was of Jewish extraction; and his father, who was a respectable member of the stock exchange, brought him up to his own business. There was an alienation between them on account of the son marrying out of the Jewish persuasion, and conforming to Christianity. Young Ricardo practiced in the exchange until the year 1818, and whether from his own skill as a broker, or the favor extended to him on account of the position in which he was placed by his conformity, he realized a large fortune, preserving throughout his career in business an honorable reputation. While thus practically occupied, he was ardently working his way back to the first principles of political economy, and especially the finance department of it. In 1810 he produced a notable sensation by his pamphlet entitled *The High Price of Bullion a Proof of the Depreciation of Bank-notes*. The title was a condensation of the principle worked out in the treatise, which gave one of the earliest distinct announcements of the principle of a metallic basis, and the propensity that a paper currency always has to redundance, if it be not in some form or other restrained by the operation of such a basis. This was followed by several pamphlets, each in its turn a success in securing fame and influence. In 1817 appeared his principal work *On the Principles of Political Economy and Taxation*. He had previously in one of his pamphlets touched on the most important feature of this work—the elucidation of the true theory of rent, as not being incidental and casual, like the profits of stock, but a fund that must, under certain conditions of population, come into existence, whoever may draw it (see RENT). Some critics of Ricardo found that the elements of the theory were given in *The Bee* by Dr. Anderson (see ANDERSON, JAMES). Ricardo, however, who probably had not read *The Bee*, reached his conclusions in a different and original form, and from his happy method of elucidation, at once secured a general adhesion to the soundness of the theory, which was strengthened by comparing it with Anderson's remarks. Ricardo's work is one of the clearest and least tedious of all books on political economy. Like almost all works, however, written before free trade actually showed its power, it narrows the influence of the elements from which the riches of the world can be increased. Like Malthus, he was unable to anticipate the effect of an industrious people having the whole world for their market, and spoke of population outrunning subsistence, and the wages of labor being measured by the price of commodities. In 1818 he entered parliament, and kept his seat till his death. As he had a very clear method of announcing a principle, and being known as a successful man of business, his speeches had perhaps more influence in all matters of trade and money than those of any other member in the present century. He was a zealous student of geology, chemistry, and other sciences. He died Sept. 11, 1823.

RICA'SOLI, Bettino, Baron, b. at Florence, Mar. 9, 1809; is descended from a very ancient Lombard family, which established itself in Tuscany in the 13th century. Ricasoli studied at Pisa and Florence, and from an early period of his life was imbued with a desire to ameliorate the civil and religious condition of his country. His friends and associates were men like Poerio, Pepe, Coletta, Giordani, Nicolini, etc. But he was averse to revolution, and finding no legitimate opening for himself in political life, quietly subsided into a country gentleman, and set about "improving" his estates. He is one of the best agriculturalists in Italy, and has written on the cultivation of the vine, of the olive, and of the mulberry. His wines of Chianti have gained for him the cross of the legion of honor. In 1847 he appeared as a politician; but he hoped to obtain liberty and good laws from princes, and not from the people, and when Leopold II. fled to Gaeta, he retired from public life. Very soon, however, he joined with other Tuscan gentlemen, and after the defeat of Novara, he overthrew the government of Guerrazzi, and recalled the grand duke, trusting to the constitutional promises given by the latter. Leopold returned, accompanied by the Austrians; and Ricasoli, indignant at this treachery, sent back his decoration to the prince, and shut himself up in his castle of Brolio—addicting himself more than ever to agricultural pursuits. For ten years he worked successfully at the drainage of the Tuscan Maremme (q.v.). In 1859, when Tuscany wished to take part in the war of Italian independence, Ricasoli reappeared. The grand duke fled, and Ricasoli was made dictator of Tuscany. After Villafranca he remained alone in the government, beset by the French emissaries, who were advising him to recall Leopold II. Ricasoli fiercely refused to do so; he wished the annexation to Piedmont; and to those who spoke of the dangers he was incurring, he answered in those words which history will never forget: "*Dopo Villafranca ho sputato sulla mia vita*"—literally, "After Villafranca I have spit upon my life." His obstinacy saved Italy, and produced the unity of the peninsula. On the death of Cavour (1861), Ricasoli was called to the ministry, and by another abrupt and decided act he promulgated political and administrative unity. His cabinet, undermined by Ratazzi, did not stand, and he therefore resigned (Mar., 1862). Ricasoli returned to power in June, 1866, and retired in April the following year, when he was succeeded by Ratazzi.—See M. Luigi Passerini's *Genealogia e Storia della Famiglia Ricasoli* (Florence, 1861).

RICCI, Matteo, a celebrated Italian, founder of the Jesuit missions to China, was born at Macerata, in the marches of Ancona, Oct. 6, 1552; and after studying law at Rome, entered the society of Jesus in 1571. Six years later he accompanied to India père Valignan, "inspector-general of the eastern missions." On account of his fine combination of zeal and tact, he was chosen by his superior to introduce a knowledge of the Christian religion into China, and after preparing himself for the arduous undertaking by a study of the Chinese language at the Portuguese settlement of Macao, he endeavored to effect an entrance into the empire. But his first efforts were vain, and it was not till 1583 that the Jesuit fathers obtained permission to settle at Tchao-king-fu. Ricci quickly saw that it was hopeless to attempt the conversion of the Chinese except by accommodating himself to their intellectual tastes and beliefs, as far as the principles of his religion permitted. Aware of the value which the ruling class—the mandarins—attached to literary skill, he executed and published a Chinese *Map of the World*, and also a little *Catechism*, in which he set forth only such portions of Christianity as embody the general principles of morality. These two productions won Ricci a high reputation among the Chinese *literati;* the most illustrious mandarins came to visit him, and expressed their esteem for his character and talents. In 1595 he boldly resolved to go to Pekin, believing that he could accomplish far more as a religious propagandist in the metropolis than elsewhere. Having obtained permission from his superiors to assume the dress of a Chinese scholar, he set out in the train of a mandarin, who did not allow him, however, to proceed further than Nankin. Expelled thence, he was obliged to return homeward; but at Nan-tchang-fu, the indomitable and adroit priest composed two treatises, entitled the *Art of Memory*, and a *Dialogue on Friendship*, in imitation of Cicero, which so pleased the taste of the Chinese that they ranked them along with their most esteemed books, and the fortunate author was allowed to proceed north. He reached Pekin, and although he could not obtain an interview with the sovereign, he was permitted to fix his residence at Nankin, the second city in the empire, where his fame as a scholar increased from day to day. In 1600 he and his companions were allowed to settle at Pekin, and even to build a church. He spent the remainder of his life in teaching mathematics and other sciences, in writing works of a secular as well as a religious kind, and in using his great influence with the king, the court, and the learned classes generally to obtain a favorable attention to the claims of that religion which he represented. Ricci made several striking conversions, and through his zeal missionary establishments were set up in the principal cities of China. He died May 11, 1610, and was universally mourned. In the annals of the Chinese empire he is designated sometimes *Li-ma-teou*, and sometimes *Si-thai*. The most important (for us) of his numerous writings, are his memoirs, published by père Trigault, under the title of *De Christiana Expeditione apud Sinas suscepta ab Societate Jesu, ex M. Riccii Commentariis Libri V.* (Augsb. 1615; Lyons, 1616), which contains a vast number of valuable observations on the geography and history of China. The family of Ricci possess 66 interesting letters of the great missionary.

RICE, *Oryza*, a genus of grasses, having panicles of one-flowered spikelets, with two very small pointed glumes; the florets compressed, the paleæ strongly nerved, awned or awnless, six stamens, one germen and two feathery stigmas. The only important species is the COMMON R. (*O. sativa*), one of the most useful and extensively cultivated of all grains, supplying the principal food of nearly one-third of the human race. It seems to be originally a native of the East Indies, but is now cultivated in all quarters of the globe, and almost wherever the conditions of warmth and moisture are suitable. It is adapted to tropical and subtropical climates, rather to the latter than the former; and requires much moisture, rather, however, in the soil than in the air. Rice is an annual, varying from one foot to six feet in height. There are many other distinguishing characters of the varieties in cultivation; some having long awns, and some being awnless; some having the chaff (*paleæ*), when ripe, yellow, white, red, black, etc. The seed or grain of rice grows on little separate stalks, springing from the main stalk; and the whole appearance of the plant, when the grain is ripe, may be said to be intermediate between that of barley and of oats. Rice requires a moist soil, sometimes flooded; and the cultivation of it has in many places been attended with an increase of intermittent fevers, and of general unhealthiness, the rice-fields being artificially flooded at certain seasons. The cultivation of rice is most extensively carried on in India, China, Cochin-China, and other s.e. parts of Asia, Japan, Egypt, South Carolina, Georgia, and other southern states of North America. The quantity exported from India, whence we obtain our chief supplies, was, in 1871, estimated at 16,336,335 qrs., valued at £4,468,000. The total import into this country in 1875 was 6,678,452 qrs., value £2,991,354. In some parts of the east, canals are carried along the sides of hills, in order to the irrigation of land for the cultivation of rice. In Carolina, rice is sown in rows, in the bottom of trenches, which are about 18 inches apart; the trenches are filled with water to the depth of several inches, till the seeds germinate; the water is then drawn off, and afterward the fields are again flooded for rather more than a fortnight, to kill weeds. They are flooded again, when the grain is near ripening.—In Europe, the cultivation of rice is confined to the most southern regions. It is most extensively carried on in the plains of Lombardy, and in Valencia in Spain. Attempts have been made to cultivate it in more northern parts of Europe, but without success. Marshy situations, where there is always the same abundance of water, are not so suitable to rice as those in which the supply of water is regulated according to the season and the growth of the plant.

Like most cultivated plants, it is very liable to variation, and in India and Ceylon at least, 120 known varieties are cultivated. The best of all rice known in the market is that of Carolina, yet the introduction of rice into that country took place only about the last years of the 17th or the first of the 18th century. Its cultivation there, however, rapidly extended.

Rice is known in India as *paddy*. Another use of this name is to designate rice in the husk.

In China, rice is generally sown pretty thickly on very wet land, and afterward transplanted to the land which it is finally to occupy. The plants *tiller* or spread at the root very much, so that each sends up several or many stalks. The rice-grounds are carefully kept clear of weeds, although often so wet that a man cannot walk in them without sinking to the knees. In many parts of China, and in other warm countries, it is common to obtain two crops of rice in a year.

Rice is shelled and quickly dried before being brought to market. Good Indian rice has the following composition:

	Per cent.
Moisture	13.00
Nitrogenous matter	7.44
Starch	77.63
Fatty or oily matter	0.70
Ash	1.23
	100.00

Rice contains, therefore, according to the prevalent views of modern chemists, a smaller amount of *flesh-forming* substances, and a larger amount of *fat-forming* or *heat-giving* substances than any other grain. As a food, it is peculiarly well adapted for hot climates, as it appears to be almost a cure for dysentery and other bowel complaints, independently of which it is a sufficiently nutritious food without being heating. Owing to the small quantity of gluten which it contains it is capable by itself only of an imperfect fermentation, and is unfit for being baked into bread. It is, however, subjected to fermentation in many countries. The beer made from rice by the Japanese is called *saki*, and is in general use among them; but before being drunk, it is heated in kettles. Several kinds of *rice wine* are made by the Chinese, some of them highly esteemed, and very intoxicating. A spirit is distilled from the lees, called *shou-choo* or *sam-choo*. The common arrack (q.v.) of the east is made from rice, and rice is also employed to a very great extent by distillers in Britain.

Rice starch is made in considerable quantity in Britain. It is sold under the name of *patent starch*, and is used in laundries and muslin manufactories. The straw of rice is used to make straw-plait for bonnets.

The refuse of rice, which remains when it is cleaned for the market, and consists of the husk, broken grains, and dust, is valuable as food for cattle. It is known as *rice-meal* and *rice-dust*.

CANADA RICE (*zizania aquatica*), the WILD RICE of North America, is a species of grass quite different from the true rice, and of a different genus. It is common in North America, and particularly abundant in the north-western parts of it; growing in miry places or shallow water, often in the margins of lakes. It has a culm 7 to 8 ft. high, with broad diffuse leaves, and a large terminal panicle of male flowers, with a spike of female flowers at the summit. The flowers have six stamens. The seeds are about half an inch long, slender, farinaceous, affording very good meal, and much used by the Indians where the plant abounds. Attempts to introduce this plant into Britain have hitherto proved unsuccessful; but, there are many northern regions apparently more suitable to it, and it has not received all the attention it deserves.

RICE (*ante*). The origin of the growth of rice in America is referred to the latter part of the 17th c., when a vessel from Madagascar is said to have brought a sack of the grain to Charleston, S. C., which was planted there and yielded largely. The culture spread, and eventually it became the staple product of that state, and was nowhere else grown so extensively until after the war of the rebellion. The mode of culture best adapted to the plant in South Carolina has been found to be by irrigation, and it is chiefly grown where the land is overflowed by the tides. The cultivation of rice spread rapidly from the beginning into most of the southern states, and even so far north as Missouri, Tennessee, and Illinois. But of late years Louisiana has been the most successful of any state in its cultivation. There it is grown on lowlands subject to overflow from the river, with due precautions against a possible crevasse. The water is conveyed by ditches and laterals, and is alternately turned on and drained off, as the condition of the plant and its progress may demand. When mature the water is finally drained off, and the grain is cut and left to dry. After thrashing, it is winnowed and placed in sacks, ready for the mill or market. The "upland" rice is dry-cultivated, and is claimed by some planters to be better than the lowland. It is grown upon high and dry land, and, after the manner of other grain, the yield is not so generous as with the lowland. The increase of rice cultivation in Louisiana was due to the blockade of the s. Atlantic ports during the war. In 1863–64 it amounted to only 21,461 sacks; in 1869–70 it had increased to 100,748 barrels. After this there was a falling off, and it did not reach the same figure until 1875, when it was 104,963 barrels, equivalent to about 24,000,000 pounds. In 1849 the total rice product of the United States was 215,313,497 pounds; in 1859, 187,167,032; in 1869, 73,635,001. In North Carolina rice culture is practically restricted to a small area of tide-water lands on the cape Fear river. Georgetown district, in South Carolina, is the most northerly portion of the tide-land rice districts of the south, and supplies most of the seed to the other portions of our southern rice-field. The imports and exports of rice for the ten fiscal years ending 1877 were as follows:

YEARS.	IMPORTS.		FOREIGN RE-EXPORTS.		DOMESTIC EXPORTS.		TOTAL EXPORTS.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1868	59,140,707	$1,636,492	11,908,953	$403,941	3,079,043	$170,357	14,987,996	$574,298
1869	53,065,191	1,325,234	8,868,664	284,682	2,232,833	145,934	11,101,497	430,466
1870	48,123,939	1,007,612	15,212,833	454,316	2,133,014	127,655	17,345,847	581,971
1871	64,655,827	1,876,786	10,212,920	280,463	445,842	22,502	10,658,762	302,965
1872	74,642,681	2,317,172	12,651,959	378,996	403,835	28,768	13,055,794	407,764
1873	83,755,225	2,304,696	20,202,774	591,417	276,627	19,740	20,479,401	611,157
1874	78,257,716	2,083,248	25,840,877	763,497	558,922	27,075	26,399,799	790,572
1875	59,414,749	1,547,697	12,352,330	342,894	277,337	19,831	12,629,667	362,725
1876	71,561,852	1,693,547	16,610,614	406,553	439,991	30,918	17,050,605	437,471
1877	60,978,659	1,439,767	14,483,645	369,235	1,306,982	78,112	15,790,627	447,347

RICE, a co. in central Kansas, drained by the Arkansas and Little Arkansas rivers; crossed by the Atchison, Topeka and Santa Fé railroad; 900 sq.m.; pop. '80, 9,292—8,549 of American birth. The surface is mostly prairie. The soil is fertile. The principal productions are corn and wheat. Co. seat, Lyons.

RICE, a co. in s.e. Minnesota, drained by Cannon and Straight rivers; intersected by the Chicago, Milwaukee and St. Paul railroad; about 500 sq.m.; pop. '80, 22,480—15,691 of American birth. The surface is level and fertile, and there are several small lakes; wheat, corn, oats, hay, cattle, and dairy products are the staples. Limestone is found. Co. seat, Faribault.

RICE, ALEXANDER HAMILTON, LL.D., b. Mass., 1818; educated at Union college. He became a large paper manufacturer, served in the Boston common council, and was mayor of that city 1857–59. He was member of Congress 1859–67, and governor of Massachusetts 1875–78.

RICE, DAVID, 1733–1816; b. Va.; graduated at Princeton college in 1761; ordained pastor of the Presbyterian church, Hanover, Va.; in 1783 went to Kentucky, where he labored 15 years. He assisted in establishing Hampden Sidney college, and was a trustee of Transylvania university. He published *Essay on Baptism; Lecture on Divine Decrees; Slavery Inconsistent with Justice and Policy; Letters on Christianity* in the *Weekly Record.*

RICE, LUTHER, 1783–1836, b. Mass.; graduated at Williams college, 1810; studied theology at Andover seminary, and was one of the first American missionaries to India. He became a Baptist and returned to this country in 1813 to interest the churches of that denomination in the missionary cause. In the latter part of his life he settled in Virginia and was prominent in founding the Columbian college, Washington, D. C.

RICE, WILLIAM NORTH, PH.D., b. Mass., 1845; graduated at the Wesleyan university, Middletown, Conn., in 1865; Sheffield scientific school, Yale college, 1867; also studied at the university of Berlin; ordained in the Methodist Episcopal church in 1872; elected professor of geology and natural history in the Wesleyan university in 1867. He has already taken high rank as a broad student, a careful thinker, and an accurate writer.

RICE, INDIAN. See RICE (CANADA RICE), *ante.*

RICE-PAPER. See PAPER.

RICE-PAPER TREE. See ARALIA, *ante.*

RICH, a co. in n. Utah, bordering on Idaho, drained by Bear river and its creeks; 960 sq.m.; pop. '80, 1263—934 of American birth. The surface is mountainous; wheat, grass, and oats are produced in the valleys. Co. seat, Randolph.

RICH, CLAUDIUS JAMES, 1787–1827; b. France; of English parentage, educated at Bristol, England; at a very early age became conversant with the Arabic, Hebrew, Syriac, Persian, and Turkish languages. In 1804 went as a writer to Bombay, being a cadet in the East India co. He remained there a year and was appointed secretary to Mr. Lock, consul-general to Egypt, but on account of the death of that official was relieved from duty, and traveled through Palestine and Syria disguised as a mameluke; sailing from Bassorah to Bombay. In 1807 he resided in Bombay with sir James Mackintosh, subsequently marrying his daughter. In 1808 he went to Bagdad, and during a residence of six years made a valuable collection of manuscripts, gems, and coins. In 1811 he published *Memoirs on the Ruins of Babylon;* and in 1818, after the second visit to the site, a *Second Memoir on Babylon.* He died at Sheeraz, Persia, awaiting instructions. His collection of oriental manuscripts, coins, etc., is in the British museum.

RICH, EDMUND, Saint; 1195–1242; b. England; went to school at Oxford, and made a vow of celibacy; studied theology at the university of Paris, and lectured there on the Scriptures; taught philosophy at Oxford, 1219–26; prebendary and treasurer of Salisbury cathedral, 1219–22; consecrated archbishop of Canterbury in 1233; opposed the marriage of Simon de Montfort with Eleanor, countess-dowager of Pembroke, and excommunicated them in 1238; retired in 1239 to the Cistercian abbey of Pontigny, France, and died at Soissy in Champagne. He was canonized in 1246 by Innocent IV. Among his works are *Constitutions,* in 36 canons; *Speculum Ecclesiæ* in vol. iii. of *Bibliotheca Patrum.*

RICHARD I., King of England, surnamed CŒUR DE LION, was the third son of Henry II. by his queen Eleanor. He was born at Oxford in Sept., 1157. In the treaty of Montmirail, entered into Jan. 6, 1169, between Henry and Louis VII. of France, it was stipulated that the duchy of Aquitaine should be made over to Richard, and that he should do homage for it to the king of France; also, that he should marry Adelais, youngest daughter of Louis. In 1173 Richard joined his mother and his brothers Henry and Geoffrey in their rebellion against the king. The rebels submitted in Sept., 1174, when two castles in Poitou were allotted to Richard. In 1183 a second family feud broke out in consequence of Richard refusing to do homage to his elder brother Henry for the duchy of Aquitaine. In this war his father sided with Richard against Henry and Geoffrey. It was ended by the death of prince Henry, when Richard, actuated probably by jealousy of his youngest brother John, declared himself the liegeman of France for his possessions in that country. This step led to a war between the king of England and Philip of France, in which Richard fought against his father. The balance of success being decidedly with France, a treaty in accordance with this fact was about to be executed, when, by the death of Henry II., on July 6, 1189, Richard became king of England. He landed in his own country on Aug. 15, 1189, and was crowned in Westminster abbey on Sept. 3 following. In the hope of gaining salvation, and with the certainty of following the occupation which he loved best, he now set out with an army to join the third crusade, then about to leave Europe. He united his forces to those of France on the plains of Vezelai, and the two armies (numbering in all 100,000 men), marched together as far as Lyons, where they separated and proceeded by different routes to Messina, where they again met. Here Richard betrothed his nephew Arthur to the infant daughter of Tancred, king of Sicily, with whom he formed a close alliance. The Sicilian throne was at that time claimed by the emperor Henry VI.; and the alliance with Tancred, from this cause, afterward turned out a very unlucky one for Richard. Having settled a difference which now arose between him and Philip respecting his old engagement to Philip's sister Adelais, the English king, on April 7, 1191, sailed from Messina for Cyprus, carrying along with him Berengaria, daughter of Sancho VI., king of Navarre. He had fallen in love with this princess, and he married her in the island of Cyprus, where he halted on his way to Palestine. But even love did not make him forget his favorite pastime of war: he attacked and dethroned Isaac of Cyprus, alleging that he had ill-used the crews of some English ships which had been thrown on his coasts. Having then presented the island to Guy of Lusignan, he set sail June 4, 1191, and on the 10th of the same month he reached the camp of the crusaders, then assembled before the fortress of Acre. The prodigies of personal valor which he performed in the Holy Land have made the name of Richard the lion-hearted more famous in romance than it is in history. The man was the creation and impersonation of his age, and the reader who follows his career may perhaps be more interested than he would be by the lives of greater men, or by the history of a more important period. On Oct. 9, 1192, he set out on his return to England. After some wanderings and adventures, he became the captive of the emperor Henry VI., who shut him up in a castle in the Tyrol. John, meanwhile, ruled in England, and he and Philip of France had good reasons for wishing that Richard should never return to his kingdom. He disappointed them; not, however, until he had paid a heavy ransom, and even, it is said, agreed to hold his kingdom as a fief of the empire. On Mar. 13, 1194, he found himself once more in England. His brother John, who had acted so treacherously toward him, he magnanimously forgave, but with Philip of France he could not deny himself the pleasure of a war. In the contest which followed he was generally victorious, but in the end it proved fatal to himself. He was killed by an arrow shot from the castle of Chaluz, which he was besieging, on Mar. 26, 1199. If Richard had the vices of an unscrupulous man, he had at least the virtues of a brave soldier.—See *Chronicles and Memorials of Richard I.*, by W. Stubbs, from MS. in lib. of Corpus Christi col., 1864.

RICHARD II., King of England, the second son of Edward the Black Prince and Joanna of Kent, was born at Bordeaux on April 3, 1366. He succeeded to the throne on the death of his grandfather, Edward III., June 28, 1377. He being a minor, the government was vested in a council of twelve, from which were excluded the king's three uncles, John of Gaunt, duke of Lancaster; the earl of Cambridge, afterward duke of York; and the earl of Buckingham, afterward duke of Gloucester. This arrangement is, however, supposed to have been collusive, and intended to lull the popular suspicion of Lancaster, under whose control the council really was. The reign of Richard is interesting to the student of English constitutional history. We find the recently established house of commons eagerly pressing forward to procure a share of political power, by means of the efficient engine of which it had then acquired the sole control—the right of taxation. Again, we find the laboring classes now beginning to aspire to be freed from the state of bondage in which they had hitherto been kept. The famous capitation tax, imposed in 1380, gave rise in the following year to the rebellion of Wat Tyler (q. v.). In June, 1382, Richard was married to Anne of Bohemia, daughter of the emperor Charles IV. The next two years were occupied with a war with France, transferred in 1385 to Scotland, where for a while the king conducted it in person. In the absence of John of Gaunt in Spain, the duke of Gloucester had put himself at the head of affairs; and an attempt which Richard made at this time to free himself from control having been defeated, several of his counselors were put to death, which step, on the part of the victorious party, was approved of by parliament, by whom further executions were ordered among the king's adherents; and the sentences were carried into effect. In 1389, however, Richard, by a sudden movement, succeeded in throwing off the yoke. Gloucester was obliged to retire; but from indolence and want of capacity, the king soon allowed the reins of government to slip from his own hands into those of the duke of York, and Lancaster's son, Henry of Bolingbroke. In 1394 the queen died, and soon after a marriage treaty was concluded between Richard and Isabella, infant daughter of Charles VI. of France. Gloucester reprobating this marriage, which seems to have been unpopular, Richard caused him to be privately arrested and conveyed to Calais, where he died, or was murdered, as has been conjectured. On the meeting of parliament, the king had his own way; the earl of Warwick was banished, and the earl of Arundel beheaded. Having triumphed over his foes, Richard now began to quarrel with his friends. A misunderstanding having taken place between Bolingbroke and Mowbray, duke of Norfolk, the king, desirous to be rid of both, sent the former into banishment for ten years, and the latter for life. But Bolingbroke had been assiduously cultivating the popularity which his cousin had been as assiduously throwing away; and the result became apparent in 1399. On his return, in that year, from a military expedition in Ireland, Richard found that Bolingbroke had, in his absence, landed in England; that he had soon found himself at the head of a formidable army, and that the duke of York had yielded and gone over to his side. The army which the king had had with him in Ireland, also, no sooner landed than it almost entirely passed over to the invader. Richard found himself without force or friend, while Bolingbroke, now styling himself duke of Lancaster, was at the head of 80,000 men. Meeting the conqueror at Flint castle, Richard was carried captive in his train to London. On Sept. 29, 1399, he formally resigned his crown. On the following day the resignation was ratified by parliament, and the crown conferred on Lancaster. By order of the peers, Richard was confined secretly in a castle, but where is not known. In the February following his resignation, the nation was told that he was dead, and his body, or what was supposed to be it, was brought with much pomp from Pontefract castle, and shown to the people. There were rumors at the time of his having been murdered, and long afterward of his being alive and in Scotland. But nothing really authentic is known regarding the end of Richard II.

RICHARD III., King of England, was the youngest son of Richard duke of York and the great-grandson of Edmund duke of York, the fifth son of Edward III. Richard was born at Fotheringay castle on Oct. 2, 1452. On the defeat and death of their father in 1460, he and his brother George, afterward duke of Clarence, were sent by their mother to Utrecht, where they remained for a short while under the protection of the duke of Burgundy, until the crown was won by their eldest brother, Edward IV. In 1470 Richard along with Edward remained in Flanders, whither they had fled on the success achieved for Margaret of Anjou by the earl of Warwick. In 1471 he led the van of his brother's army at Barnet; he also rendered efficient assistance at the crowning victory of Tewkesbury. It is said that he and Clarence murdered prince Edward, son of Henry VI., after the battle. It has also been popularly believed that he murdered Henry himself in the Tower. Now duke of Gloucester, in 1472 he married lady Anne Neville, daughter of Warwick and widow of prince Edward. He has been generally accused of complicity in the judicial murder of his brother Clarence in 1478, and Shakespeare has placed the charge almost beyond the power of historical criticism to efface. The evidence, however, seems to be almost null. In 1483, on returning from an expedition into Scotland, he heard of the death of his brother the king. He met the duke of Buckingham at Northampton, where it is believed that those measures were concerted which resulted in the execution of Hastings and others, the confinement in the Tower of the infant children of the late king, and the placing of the English crown on the head of Richard III. His reign dates from June 26, 1483. He was crowned at Westminster on July 6 following. For some time he seems to have been really popular. He was well received on a tour which he made in the northern counties. On reaching York, however, on his return, he heard of a formidable insurrection which had broken out in the south in favor of his nephew Edward V. But the bold and remorseless nature of Richard was on this occasion triumphant. It was soon known over the land that the royal children were dead. Little doubt has ever been held that they were murdered, or that the deed was done at the instigation of their uncle. The insurrection was quelled, and Buckingham, who had been at the head of it, found guilty of treason and executed. The parliament, which met on Jan. 23, 1484, declared the issue of the late king to be bastard, and the property of the late rebels confiscated. Richard now offered to marry the princess Elizabeth, daughter of Edward IV., to his eldest son, Edward, on whose premature death he offered to marry the princess himself, his own queen being still alive. On the death of Anne, however, supposed to have been murdered by poison, on March 16, 1485, Richard's counselors dissuaded him from marrying Elizabeth, on the ground of the popular indignation which the step was sure to excite. Meanwhile the crimes which his ambition had already led him to commit had excited the deepest disgust both among nobility and people. One by one his adherents were dropping off and crossing to France to join the earl of Richmond. At last the storm burst. On Aug. 7, 1485, Richmond landed at Milford Haven. On the 21st of the same month was fought the decisive battle of Bosworth. It deprived Richard both of his crown and life, and decided the long war of the Red Rose and the White in favor of the house of Lancaster. Richard was doubtless a man of great energy and ability, but in his aims selfish and unprincipled. It must, however, be kept in view that his age was one in which human life was held of little value, and deception regarded almost as an accomplishment. See Life by J. H. Jesse (London, 1862).

RICHARD OF CIRENCESTER—in Latin, *Ricardus Corinensis*—a well-known early English chronicler, was born at Cirencester in Gloucestershire, in the first half of the 14th c., but nothing whatever is known of his family or circumstances. In 1350 he entered the Benedictine monastery of St. Peter, Westminster—whence he is sometimes called the "monk of Westminster"—and remained there for the rest of his life. His leisure was devoted to the study of British and Anglo-Saxon history and antiquities. In the prosecution of his investigations Richard is said to have visited numerous libraries and ecclesiastical establishments in England, and we know for certain that in 1391 he obtained a license from his abbot to visit Rome. He died in 1401 or 1402. Richard's principal works are *Historia ab Hengista ad Ann.* 1348, in two parts, of which the first (preserved in the public library of Cambridge) treats of the affairs of England from the Saxon invasion to the death of Harold; two theological productions (in the Peterborough library), a *Liber de Officiis Ecclesiasticis* and a *Tractatus super Symbolum Majus et Minus;* and above all his *De Situ Britanniæ,* a treatise on the ancient state of Great Britain. This work—of which, however, it must be admitted that the authenticity is doubtful—was, curious to say, first brought to light by Dr. Charles Julius Bertram, professor of English at Copenhagen, in 1747, who professed to have discovered it in the royal library there, and who sent a transcript of it, together with a "fac-simile" of the original, to the celebrated English antiquary, Dr. Stukeley. This gentleman published an analysis of it in 1757, and in the same year prof. Bertram published the whole treatise, along with the "remains" of Gildas and Nennius, under the title *Britannicarum Gentium Historiæ Antiquæ, Scriptores tres, Ricardus Corinensis, Gildas Badonicus, Nennius Banchorensis.* A new edition with an English translation and and a "fac-simile," a biography of the supposed author, appeared at London in 1849, and a reprint forms one of the "Six Old English Chronicles" in Bohn's "Antiquarian Library" (1848). If we could feel quite sure that the work was genuine, it would be of the highest importance for the study of British and Roman-British antiquities, but unfortunately Bertram's "original" (like the "original" of Macpherson's *Ossian* and Joe Smith's *Book of Mormon*) is not to be found, nor does it appear that anybody ever saw it but himself, so that Gibbon's praise, "that he [Richard] shows a genuine knowledge of antiquity very extraordinary for a monk of the 14th century," must be regarded with suspicion.

RICHARD PLANTAGENET, second son of John king of England, was born Jan. 5, 1208. In 1226 he was created earl of Cornwall by his brother Henry III. In 1232 he put himself at the head of the party opposed to Hubert de Burgh, whose influence was at that time supreme in the councils of the king. Immense wealth, a calm, practical temperament, and a shrewd eye for his own worldly interest were the elements which combined to make Richard Plantagenet a considerable power in the state. His influence prevailed, and De Burgh was driven from his position with loss both of honors and estate. In 1256 Richard Plantagenet was elected titular king of the Romans; and though his election was disputed, he was crowned at Aix-la-Chapelle. Subsequently he exercised some of the nominal rights which belonged to his sovereignty. In the great struggle which took place between Henry III. and his nobles, Richard Plantagenet at first acted the part of a mediator; subsequently, however, he took a decided part with his brother against the party which was headed by Simon de Montfort; and on May 14, 1264, he was taken prisoner by that leader at the battle of Lewes. De Montfort shut him up in Kenilworth castle, from which he was released at the end of a year. The rest of his life does not seem to have been marked by any event of historical importance. He was thrice married: in 1230 to Isabel, daughter of the earl of Pembroke; in 1243 to Sanchia of Provence, sister of queen Eleanor; and in 1267 to Beatrice, daughter of Theodoric de Falkmonte. He died on April 2, 1272. His character seems to have been unmarked either by great virtues or great vices.

RICHARDS, JAMES, 1784–1823; b. Mass.; graduated at Williams college 1809; at Andover theological seminary 1812. In the summer of 1807 he, with Gordon Hale and Samuel J. Mills, were accustomed to withdraw to an unfrequented meadow at some distance from Williams college, and beside a haystack to confer and pray together concerning missions to the heathens. The spot afterward became historical, and is now marked by a neat park and a memorial stone. Mr. Richards was one of the six original signers of the memorial on missions presented to the general association of Massachusetts which led to the formation of the American board. His name and that of Mr. Rice were afterward withdrawn "lest the association should be alarmed at the probable expense of supporting six missionaries." In 1815 he sailed as a missionary of the A. B. C. F. M. for Ceylon. In 1823, having long been out of health, he took a voyage to the cape of Good Hope, where he died.

RICHARDS, WILLIAM, 1792–1847; b. Mass.; graduated at Williams college 1819, and Andover theological seminary in 1822; embarked the same year as missionary to the Sandwich islands accompanied by four natives educated in this country. In 1837 visited the United States, in 1838 became counselor, interpreter, and chaplain to the king; and in 1842, after the organization of an independent government on the islands, was sent as ambassador to England. In 1845 he was appointed minister of public instruction. His influence over the king and government was very great.

RICHARDSON, a co. in s.e. Nebraska, adjoining Kansas; bounded on the e. by the Missouri river, drained also by the Big Nemaha river and its south fork, and by the Muddy creek; on the Atchinson and Nebraska railroad; about 550 sq.m ; pop. '80, 15,028—13,030 of American birth. The surface is rolling prairies or woodland. The soil is fertile. The principal productions are wheat, corn, oats, and live stock. Co. seat, Falls City.

RICHARDSON, BENJAMIN WARD; b. England, 1828; educated at Anderson's university, Glasgow. In 1856 he became a member of the Royal college of physicians, and a fellow of the Royal society in 1867. Among his scientific discoveries were those of a special poisonous product called *septine*, and the application of ether spray for the local abolition of pain in surgical operations. Dr. Richardson has published many medical and scientific treatises, covering a wide range of topics. He was for some years the editor of the *Journal of Public Health*, and later of the *Social Science Review*. He is officer, fellow, or member of many societies in Europe and America.

RICHARDSON, CHARLES, LL.D., 1775–1865; b. England; published in 1815 *Illustrations of English Philology*. He began the lexicographical part of the *Encyclopædia Metropolitana*, but the work was suspended. The separate publication of his *Dictionary* was begun in 1835 and completed in 1837. It is a work of great value. In 1854 he published a book *On the Study of Languages*.

RICHARDSON, CHARLES FRANCIS, b. Maine; graduated at Dartmouth college 1871; became literary editor of the *New York Independent* in 1872, associate editor of the Philadelphia *Sunday School Times* in 1877, and in 1880 was made editor of a new literary journal *Good Literature*, which has a large circulation. He was one of the two editors of *The College Book;* and among other contributions to American periodicals wrote an article on Cambridge, Mass., for *Harper's Monthly* in 1876. He is the author of *A Primer of American Literature*, and *The Choice of Books*—in which are shown extensive knowledge of books and excellent literary judgment.

RICHARDSON, ISRAEL B., 1819–62; b. Burlington, Vt., descendant or gen. Israel Putnam, graduate of West Point 1841. He served in the Florida war, was brev.maj. for gallantry in the Mexican war; left the army in 1855, and settled in Michigan. In the war of the rebellion he went out as col. 2d Michigan volunteers, commanding a brigade at Blackburn's Ford and Bull Run, and a division in the peninsula campaign under gen. Sumner. He rendered important service at Manassas and South Mountain, and died from the effects of a wound at Antietam.

RICHARDSON, JAMES, 1809–51; b. Boston, England, traveled extensively in Africa as correspondent of a London newspaper, and published an account in 2 vols. with the title *Travels in the Great Desert of Sahara*. This book gained him the appointment of leader in a new expedition into central Africa in 1850, joined by Barth and Overweg. He succesfully performed the journey from Tripoli to the desert of Hammadah and Bornoo, but death stayed his progress at Ungurutua. In 1853 the notes made on this journey were published, edited by Bayle St. John, with the title of *A Narrative of a Mission to Central Africa*.

RICHARDSON, Sir JOHN, K.C.B., M.D., LL.D., etc., a celebrated traveler and naturalist, was b. Nov. 5, 1787, at Dumfries, of which town his father, Gabriel Richardson, esq., was several years provost. In his 14th year he left the academy of Dumfries to study at the university of Edinburgh, with a view to the medical profession. After obtaining his diploma, Richardson entered the royal navy, and in 1807 was appointed assistant-surgeon to the *Nymphe* frigate, in which he was present at the battle of Copenhagen. Some time later, the *Nymphe* was engaged in the blockade of the Tagus, when, after twice volunteering to go in the boats on cutting-out expeditions, Richardson was transferred to the flag-ship. After the convention of Cintra the ships left the Tagus, and Richardson was nominated to the *Blossom* sloop-of-war, in which he served on the coast of Africa, lord Exmouth removing him to the *Bombay*, 74, in 1810. His next services were in the *Cruiser*, on the Baltic and North sea stations; afterward surgeon of the 1st battalion of royal marines, stationed in Canada, and later doing service in Georgia, Richardson having charge of the hospital-ship for the sick and wounded of the brigade. His next appointment, 1819, was that of surgeon and naturalist to the overland expedition under Franklin. In 1822 Richardson returned to England, and early in 1824 became surgeon to the royal marines at Chatham. In 1825–'27 he accompanied Franklin in his overland expedition to the mouth of the Mackenzie, and by orders of the admiralty was detached to survey the coast between that river and the Coppermine, executing the task with singular success and ability. On returning from this expedition Richardson resumed his duties at Chatham, remaining there till his promotion, 1838, to be physician of Haslar hospital, and inspector of naval hospitals and fleets. In 1846 Richardson received the honor of knighthood; and two years later, moved by genuine friendship and unsurpassed self-devotion, set out to search for and if possible save his former traveling companion, sir John Franklin, of whom nothing had been heard for upward of two years. On March 25, 1848, Richardson, accompanied by Mr. Rae, departed from Liverpool to look for the missing expedition between the Mackenzie and Coppermine rivers. Landing at New York, Richardson hastened by way of Montreal and the Canadian lakes to the head-waters of the Mackenzie, which he descended, and then turned eastward by capes Bathurst and Parry. Contrary to former experience, the sea toward cape Krusenstern was found closely packed with dangerous drift-ice. After immense labor the party reached cape Hearne, where it was found necessary to abandon the boats, and after 12 days' fatiguing march, through half-frozen swamps and over hills covered with snow, succeeded in gaining fort Confidence, at the north point of Great Bear lake. Here Richardson spent the winter in scientific observations, returning to England in 1849, and resuming his duties at Haslar. In 1855 Richardson tendered his resignation, after 48 years of almost unexampled activity in the public service. Moved in all his actions by a high sense of honor and sincere piety, possessed of the most unselfish nature, and a mind so acute as almost intuitively to form correct judgments, united with the humble and loving disposition of a child, Richardson, during his long career, was one of the most lovable as well as useful men of the present century. Up till his death, June 5, 1865, he possessed much of the elasticity of youth; and whenever a scientific society assembled, he was found leaving for a time his quiet home by the lake of Grasmere to take part in the deliberations.

Richardson was a fellow of the Royal societies of London and Edinburgh, of the royal geographical society, member of the geographical society of Paris, and of many other literary and scientific bodies in Great Britain, the continent of Europe, and America. He contributed largely to the account of Franklin's first expedition (Lond. 1823); and to that of the second expedition (Lond. 1828). In 1836 appeared *Fauna Boreali-Americana, The Fish; A Boat Voyage through Rupert's Land and the Arctic Sea* (Lond. 1851); *The Polar Regions* (1861). Besides zoological appendices to the voyages of Parry, Ross, Back, etc., his contributions to the journals and transactions of various societies have been very numerous. A recent work is the *Museum of Natural History*, in conjunction with several other distinguished naturalists.

RICHARDSON, Richard, 1704–81; b. Va.; became a land surveyor, and commanded a regiment in the Indian wars. In 1775 he was a member of the Charleston council of safety. He was a member of the legislative council of South Carolina 1776, and assisted in forming the state constitution. He resisted lord Cornwallis's efforts to gain him over, was made prisoner at the capture of Charleston, and died from the effects of the privations of his prison life.

RICHARDSON, Samuel, the first great English novelist, was b. in Derby in the year 1689. His father, though originally connected with a higher grade of society, was a joiner. It was his ambition to educate his son for the church; but for this the means were found deficient, and at the age of 17, with simply such an education as a country school could then furnish, the young man fared forth to London, where he became apprentice to one John Wilde, a printer. In the discharge of his business duties he was exact and careful, and on the expiration of his apprenticeship he became foreman of Mr. Wilde's establishment. Some years afterward he started as printer on his own account in Salisbury court, Fleet street; and on finding his success assured he wedded Miss Allington Wilde, the daughter of his late employer. After her death in 1731 he was again married to a Miss Leake. By each lady he was blessed with six children, of whom only four daughters along with their mother survived him. Throughout life, in his business relations, he was prosperous; very early he had influence to secure the lucrative post of printer of the journals of the house of commons; in 1754 he became master of the stationer's company; and in 1760 he purchased the moiety of the patent of king's printer; but died on July 4 of the year following.

Richardson's genius flowered late. Till he had turned 50 his relations with literature, except in the way of printing it, were of the most slight and amateur kind; but in 1740 he surprised the world with his *Pamela*, which had instant and great success. Its continuation, to which the author was stung by the attempt of some hungry scribe to make a meal or two by the issue of a pretended sequel, entitled *Pamela in High Life*, was, however, pronounced much inferior. Memorable in itself, the work is now to most readers more so as having suggested to Fielding his *Joseph Andrews*, originally conceived as a parody of Richardson's somewhat prudish moralities. The exquisiteness of the satire was not appreciated by Richardson; and he never forgave Fielding for it, or could speak of him after with common temper or patience.

In 1748 he issued the first four volumes of *The History of Clarissa Harlowe*—by common consent his masterpiece—a work which in its progress to completion excited the most intense interest. His third and last great work, *The History of Sir Charles Grandison*, was published in 1753. As a whole, this is less interesting than its predecessors; and in his representation of the life of the fashionable classes, of which he had no clear personal knowledge, the writer succeeds but indifferently.

Richardson's method of minute elaboration has in itself some tendency toward an effect of tedium; moreover, the epistolary vehicle which he has chosen, though with certain advantages of its own, does not subserve rapidity of movement; and as his stories run to immense length, their perusal involves some effort of patience. But in the depth and simplicity of his sentiment, his profound knowledge of the heart, and mastery of elemental emotion, there are singular sources of attraction; and in virtue of the overwhelming effects of pathos in which the interest of his *Clarissa* culminates, a place must always be assigned him among the very few potent masters of genuine tragic passion. His specialty lies in subtle analysis of the intricacies of female mind and emotion; and in this particular field he has scarcely perhaps been surpassed. A curious sort of passionless confidential intimacy with women, it seems from his earliest years to have been his instinct to cultivate; throughout life he was the center of a circle of female friends and admirers, who came to him with their little delicate secrets, as to a kind of lay father-confessor; and of the fruits of his nice observation of them he has given us to the full in his novels. The success of these is said to have bred in him a somewhat inordinate vanity, the only little flaw in a character unusually blameless and amiable. Of works of less importance he published, besides occasional contributions to periodicals, *The Negotiations of Sir Thomas Roe in his Embassy to the Ottoman Porte from* 1621 *to* 1628 (1740, fol.); *An Edition of Æsop's Fables, with Reflections; Familiar Letters to and from several Persons on Business and other Subjects;* and in 1804 there appeared his *Correspondence Selected and Published, with a Biography by Anna Letitia Barbauld.*

RICHELIEU, a co. in s. Quebec, having the St. Lawrence river for its n. and n.w. boundary, and the Yamaska river on the e. and s.e.; intersected in the w. by the Richelieu river; 190 sq.m.; pop. '71, 20,048. Its surface is uneven, a large proportion covered with forests. Its soil is clayey and productive along the river bottoms. Ship-building is an important branch of industry, and engines, mill machinery, stoves, plows, leather, bricks, etc., are manufactured. Co. seat, Sorel.

RICHERAND, ANTHELME, Baron, 1779–1840, b. France; graduated at the Paris school of medicine; in 1807 became professor of surgical pathology in the faculty of medicine. During the occupation of Paris by the allies his care of the sick gave him a high reputation; and he was made a baron by the French government. His chief work is his *Nouveaux Eléments de Physiologie*, 1801.

RICHELIEU, ARMAND JEAN DU PLESSIS, Cardinal, Duc de, was b. of a noble but impoverished family at Paris, Sept. 5, 1585, and was educated for the military profession at the college de Navarre. On the retirement to a religious life, however, of his elder brother, who held the bishopric of Luçon, Richelieu, with a view to succeeding to this preferment, betook himself to ecclesiastical studies, and underwent the preliminary examination for his degree at the Sorbonne. In 1607 he was consecrated bishop of Luçon at Rome by cardinal de Givry, in presence of pope Paul V., and for some time devoted himself zealously to the discharge of his duties in his diocese. At the states-general in 1614, being appointed one of the representatives of the clergy, he attracted the notice of the queen-mother by an address which he delivered in the presence of the young king, Louis XIII.; and by his appointment in 1616 as secretary at war and foreign affairs, the way seemed opened to his success in political life; but in one of the vicissitudes of state intrigue common at that period, he soon found it necessary to withdraw from court, and return to his diocese. Meanwhile a rupture occurred between the queen-mother and the king, and Richelieu, through the agency of a very remarkable man—the celebrated Capuchin father Joseph—whose fortunes thenceforward were inseparably united with those of Richelieu, succeeded in effecting their reconciliation (Aug. 1620), and the restoration of the queen to her position at court. The foundation of Richelieu's influence in consequence was solidly laid; but he appears to have acted with much tact and patient forbearance. He formed an alliance with the powerful favorite, the duc de Luynes, and 1622 was named cardinal, and two years later, 1624. he was made minister of state—a position which, although frequently menaced, and constantly beset by every variety of court intrigue, he retained to the end of his life. His first important measure was the conclusion of the alliance with England, by the marriage of Henrietta, sister of the king, with Charles, then prince of Wales, in 1624. His successful conduct of the war of the Valteline, an affair of much delicacy for a cardinal, as presenting the pope himself as the antagonist of France, tended still more to strengthen his power. His enemies, however, were constantly on the watch for opportunities of undermining his influence, and even of bringing about his death. The queen withdrew her favor, and the king, while he trusted him implicitly, never ceased to fear him. The crisis of the struggle took place Dec. 11, 1630, when Richelieu himself believed that his fate was inevitable. His disgrace, indeed, had been decided; the king fearing to meet him face to face, had refused him an audience. His attempts to force an entrance to the king at the Luxembourg were defeated; but Louis, in his weak fear of Richelieu having withdrawn to Versailles, the cardinal there succeeded in obtaining an audience, and having once effectually overborne the weakness and alarmed the fear of the sovereign, his supremacy remained from that day firmly and irrevocably established. This famous day is known as *Le Journée des Dupes.*

The administration of Richelieu forms an epoch in the history of the constitution of the kingdom of France, as well as of her relations with other countries. It is memorable for several great measures, or series of measures, through which the posture of affairs underwent a complete and permanent change. Of these, the first and the most lasting in its results was that by which the absolute authority of the sovereign was established. From the mediæval period the power of the French kings had been controlled and, in many cases overridden by the feudal privileges of the nobles; and in the stormy conflicts of the 16th and of the beginning of the 17th centuries, the power of the crown had often been reduced to a cipher. By a succession of vigorous and energetic and, it must be added, not unfrequently unscrupulous measures, Richelieu succeeded in breaking down the political power, and subduing the arrogant assumptions of the great families; the heads of several among which were brought to the scaffold, while not a few were condemned to life-long imprisonment. Among his most inveterate and most powerful adversaries was Gaston, duke of Orleans, brother of the king; but Richelieu triumphed over him, and even the queen-mother, Maria de Medicis, was obliged to bow before the unbending spirit of Richelieu, and to withdraw into exile at Cologne; and Richelieu, at the close of his career, delivered up the royal authority, which he had wielded for 18 years, almost without a single constitutional check upon its absolute exercise.

Another of the great enterprises of this minister was the overthrow of the Huguenot party as a political power, and a rival of the throne in France. The siege and capture of Rochelle, which he conducted in person (1628), was followed by the submission of the other Huguenot strongholds. Richelieu, however, secured for the Huguenot body a certain measure of religious toleration; and, on the whole, is confessed to have used his success in this conflict with moderation.

In the external relations of France, the great object of all his measures was the overthrow of the preponderance of Austria. With this view he did not hesitate to foment the internal disaffections of Germany, even allying himself with this design with the German Protestants, and even with the great champion of the Protestant cause, Gustavus of Sweden; and in connection with his anti-Austrian policy, he also took part with the disaffected Spanish provinces in the Netherlands. His designs on Belgium, however, failed of success. With similar views he lent his support to the revolt of Catalonia against Philip IV., and sent an army into Piedmont; nor is there any part of his foreign policy to which he adhered with such pertinacity to the very end of his life.

His internal administration of France has been severely criticised. He was reckless and unscrupulous in the use of means against his enemies, and the expenditure which his foreign wars entailed led to many and oppressive impositions. His own personal expenditure was magnificent even to prodigality, but he is acquitted of all sordid schemes of self-aggrandizement.

Richelieu died at Paris, Dec. 4, 1642. Notwithstanding his many distracting occupations, the writings which he left behind fill several volumes. Some of these, ascetical or controversial, were written before his entrance into political life. Of his later writings, his *Testament Politique* and his *Memoirs* have attracted much notice. He even indulged occasionally in literature, and wrote two plays of indifferent reputation. His letters are numerous, and many of them full of interest. He was a liberal patron of literature, and to him France owes the establishment of the royal printing presses and the foundation of the French academy.

RICHLAND, a co. in s.c. Illinois, drained by the Little Wabash river and Fox and Bonpas creeks, traversed by the Ohio and Mississippi and the Grayville and Mattoon railroads; about 350 sq.m.; pop. '80, 15,546—14,644 of American birth. The surface is rolling and heavily timbered. The soil is fertile. The principal productions are corn, oats, and wheat. Co. seat, Olney.

RICHLAND, a parish in n.e. Louisiana, drained by Bœuf bayou and Big creek; intersected by the North Louisiana and Texas railroad; 340 sq.m.; pop. '80, 8,440—8,360 of American birth, 5,236 colored. Cotton, corn, and pork are the staples. Chief town, Rayville.

RICHLAND, a co. in n. central Ohio, drained by the Black and Clear forks of the Mohican river; intersected by the Pittsburg, Fort Wayne and Chicago, the Atlantic and Great Western, and the Sandusky railroads; 500 sq.m.; pop. '80, 36,306—33,749 of American birth. The soil is unusually fertile; wheat, corn, oats, hay, butter, maple sugar, and cattle are the staples. Co. seat, Mansfield.

RICHLAND, a co. in central South Carolina, drained by the Wateree and Congaree rivers, which unite to form the Santee, and by the Broad; intersected by the Charlotte, Columbia and Augusta and other railroads; 470 sq.m.; pop. '80, 25,585—14,737 of American birth, 19,396 colored. The surface is slightly hilly; cotton, corn, and pork are the chief products. Co. seat, Columbia, the capital of the state.

RICHLAND, a co. in s.w. Wisconsin, drained by the Wisconsin river and Eagle and Pine creeks; on the Pine River Valley and Stevens's Point railroad; about 600 sq.m.; pop. '80, 18,174—16,293 of American birth. The surface is rolling and heavily timbered. The soil is fertile. The principal productions are corn, wheat, oats, hops, and live stock. Co. seat, Richland Center.

RICHMOND, a co. in e. central Georgia, bordering on South Carolina; drained by by the Savannah river, its n.e. boundary, and several creeks; intersected by the Central and the Georgia railroads; 330 sq.m.; pop. '80, 34,569—33,111 of American birth, 17,483 colored. The surface is broken and hilly; corn, cotton, and pork are the staples. Granite is found. Co. seat, Augusta.

RICHMOND, a co. in New York, consisting of Staten Island, in New York bay, divided from New Jersey by Staten Island sound and Kill van Kull bay; from Long Island by the Narrows; about 55 sq.m.; pop. '80, 38,994—28,033 of American birth. Staten Island is about 14 m. long. The surface is hilly, and contains iron. The scenery is beautiful. There are many fine residences and villas of New York business men. The soil is fertile. The principal productions are corn and hay. Co. seat, Richmond.

RICHMOND, a co. in s. North Carolina, adjoining South Carolina; between the Lumber river on the e. and the Pedee on the w.; traversed by the Carolina Central railroad; about 775 sq.m.; pop. '70, 12,882—6,598 colored. The surface is rolling and heavily timbered. The soil is fairly fertile. The principal productions are cotton, corn, turpentine, and tar. Co. seat, Rockingham.

RICHMOND, a co. in Nova Scotia, including the s. part of Cape Breton island, also Arichat and two or three other small islands; intersected by St. Peter's canal; 622 sq.m.; pop. '71, 14,628. Fishing is the chief occupation of the inhabitants. Co. seat, Arichat.

RICHMOND, a co. in e. Virginia, drained by the Rappahannock river; about 175 sq m.; pop. '80, 7,198—3,434 colored. The surface is level and heavily timbered. The soil is fertile in parts. The principal productions are corn and wheat. Oyster fishing is largely pursued. Co. seat, Warsaw.

RICHMOND, a co. in s. Quebec, drained by the St. Francis and other rivers, and intersected by the Grand Trunk railroad; 556 sq.m.; pop. '71, 11,213. Wheat, oats, hay, and cattle are the staples. Water-power is abundant and there are many manufactured articles. Copper ore and building stone are found. Co. seat, Richmond.

RICHMOND, a market t. and parliamentary and municipal borough in the North Riding of Yorkshire, on the left bank of the Swale, 42 m. n.w. of York. The parish church is chiefly in Gothic, but partly in Norman architecture; the grammar-school has an endowment of £270 a year, and attached to it are six scholarships. Though the trade of Richmond is now much less extensive than in earlier ages, iron and brass founding and tanning are carried on, and there are a paper and several corn mills. The borough returns one member to the house of commons. Pop. of municipal borough in '71, 4,443.

The earldom of Richmond was conferred by the Conqueror upon his kinsman, Alan Rufus, count of Bretagne; but came into the possession of the crown when Henry, earl of Richmond, succeeded Richard III. as Henry VII. The title of duke of Richmond was afterward conferred by Charles II. upon his son Charles Lennox, in whose family it still remains. The castle, surrounded by picturesque scenery, stands on a rock overlooking the river. In the vicinity are some ruins of a small monastery, founded in 1258.

RICHMOND, a rising t. of Surrey, 10 m. w.s.w. of London by railway, stands partly on the summit and declivity of Richmond hill, and partly on the level right bank of the Thames. The rich and beautiful scenery of the vicinity is seen with advantage from the terrace, which stretches along the brow of the hill. The parish church contains the tombs of Thomson the poet, and of Edmund Kean the tragedian. The banks of the Thames are studded with villas, and around the town are numerous nurseries and kitchen gardens. Pop. '71, 15,113, who derive their subsistence chiefly by providing for the wants of the immense number of visitors and pleasure-seekers who frequent the town, especially during summer.

Richmond, which was formerly called Scheen or Sheen, received its present name from Henry VII., who named it after his own earldom. It was a royal residence in the time of Henry I., and since that time the sovereigns of England have frequently resided here, and here Edward III., Henry VII., and Elizabeth died. Richmond park, 8 m. in circuit, is open to the public.

RICHMOND, a city of Indiana, on the e. fork of Whitewater river, 70 m. n.w. of Cincinnati, and the focus of several railways. It was founded by a colony of Friends in 1816. The river gives water-power to factories of cotton, wool, flour, and several extensive implement factories. Richmond has a brisk trade with a fertile and populous country. There are 20 churches and 8 newspapers. Pop. '60, 6,603; '70, 9,445; '75, 11,579.

RICHMOND (*ante*), a city in e. Indiana, 68 m. e. of Indianapolis, 92 m. s.e. of Fort Wayne, and 41 m. w. of Dayton, Ohio; pop. '80, 12,743. It is the co. seat of Wayne co., on the Cincinnati, Richmond and Chicago railroad, the Columbus, Chicago and Indiana Central, and the Cincinnati, Richmond and Fort Wayne. It has good educational advantages, a public library of 10,000 vols., with a scientific association, and a museum, 2 theaters, several public halls, and street railways. There are 3 national banks with an aggregate capital of $1,000,000, a steam fire-department, and excellent drainage. It has a Friends academy, and is the seat of Earlham college, with a preparatory department and a library of 3,500 vols., organized 1859; open to both sexes, and under the direction of the society of Friends. It is the place of yearly meeting for the Friends in Indiana. It is also the seat of 2 Lutheran and 2 Roman Catholic schools, and a business college. In the n.e. section are the county fair grounds, 33 acres in extent. The slaughtering of hogs is an important industry. It has 43 benevolent associations; 2 charitable organizations, conducted solely by ladies; also an orphans' home, and a home for friendless women.

RICHMOND, the capital of Virginia, on the left bank of the James river, at the head of tide-water, 150 m. from its mouth; lat. 37° 32′ 17″ n., long. 77° 27′ 28″ w.; 100 m. s. of Washington, picturesquely situated on the Richmond and Shockoe hills, on the lower falls of the James river, and regularly laid out and built, and surrounded with beautiful scenery. The capitol is a stately building in the center of a park of 8 acres, the grounds of which are ornamented with trees and statuary. There are also handsome state and county edifices, penitentiary, theater, orphan asylum, 50 churches, 3 colleges, 7 daily and 14 other newspapers, several cotton and tobacco factories, extensive flouring-mills, forges, furnaces, and machine-shops. Tobacco and flour are the principal articles of export from Richmond. Vessels drawing 10 ft. can come within a mile of the center of the city; those of 15 ft. to 3 m. below. A canal round the falls gives a river navigation 200 m. farther, and a canal and several railways connect it with the great network of southern railways. Richmond was founded in 1742. In 1811 the burning of a theater destroyed the lives of 70 persons, including the governor of the state. In June, 1861, it was selected as the confederate capital, and from that period was the objective point of a series of formidable military expeditions for its capture, under generals McDowell, McClellan, Burnside, Hooker, Meade, and Grant, and defended by gen. Lee with a large army and formidable lines of fortifications, until the seizure of the lines of supply by generals Grant and Sheridan compelled its evacuation after a series of sanguinary battles, April 3, 1865. A considerable portion of the city was destroyed by the retreating confederates. Pop. '60, 37,910; '70, 51,038.

RICHMOND (*ante*), became the capital of the state of Virginia in 1779, though then only a small village. Here the convention to ratify the federal constitution met in 1788, and it has been the scene of many other important political gatherings, national party conventions, etc. April 17, 1861, the state of Virginia seceded from the union; and July 20, Richmond was the scene of an adjourned meeting of the confederate congress, being appointed the capital of the confederacy, a position which it held during the rebellion. At this time the confederate forces in Virginia numbered 60,000 men, under the command of gen. Joseph E. Johnston, and thenceforward until the close of the war, Richmond continued to be a chief point of attack by the federal forces. The destruction in the city during the evacuation of April 3, 1865, was chiefly in the business section, and included as many as 1000 buildings; which, with that of other property, involved a loss estimated at $8,000,000. Immediately after the cessation of hostilities, re-building was begun, and proceeded with great rapidity. Five bridges across the James river connect Richmond with Spring hill and Manchester, the latter town containing two fine cotton-mills. Within a few hours' ride of the city are several battle-fields and national cemeteries. The Tredegar iron-works covering 15 acres, were employed for the manufacture of cannon during the existence of the confederacy, and are now among the most important iron-works in the country. The Gallego and Haxall flour-mills are among the largest in the world. Hollywood cemetery, in the w. part of the city is an interesting spot, as well for its historic memories and personal associations, as for its natural and artificial beauties. An interesting monument is that which marks the grave of president James Monroe. Here also lies gen. J. E. B. Stuart, who commanded Lee's cavalry during the rebellion; while hundreds of confederate dead rest within the portion of the cemetery appointed for the soldiers. Monroe and Marshall parks are respectively at the e. and w. ends of the city. Libby prison and Castle Thunder, used during the war as military prisons, are now tobacco warehouses. The state capitol is built in the Græco-composite style of architecture, with a portico of Ionic columns: the plan was drawn after that of the *Maison carrée* at Nismes, in France, and was supplied by Thomas Jefferson. In the center of the building a square hall is surmounted by a dome, beneath which is Hondon's statue of Washington, of marble, life-size, representing him in his general's uniform. On the esplanade, near the capitol square, is Crawford's famous equestrian statue of Washington, claimed to be one of the finest bronzes in the world. Horse and rider are of colossal size, the animal half thrown back upon its haunches; the statue rises from a massive granite pedestal, and is surrounded by bronze figures of Patrick Henry, Thomas Jefferson, John Marshall, and other eminent Virginians. St. John's Episcopal church is famous as the place of meeting of the Virginia convention of 1775, which decided the attitude of the colony, and in which Patrick Henry made his celebrated speech, ending—"I know not what course others may take; but as for me, give me liberty or give me death!" This church was also, in 1788, the place of meeting of the convention which ratified the federal constitution. The "Monumental" church was built on the site of the Richmond theater, destroyed by fire in 1811. Five lines of railroad intersect at Richmond, and there are regular lines of steamers connecting the city with Norfolk, Baltimore, Philadelphia, and New York. The population of Richmond in 1880, was 63,803. The manufactures included iron-works, cigar factories, coach and wagon factories, sugar-refineries, foundries, machine-shops, furniture, sheetings and shirtings, stoneware, etc. The city is generally well laid out, and well built, the streets are lighted with gas; in the business quarter are solid and handsome structures, and the private residences are usually built in the midst of gardens and lawns. The river view is fine at many points, particularly on Libby hill (Marshall park). In the state library are about 40,000 volumes, and this institution contains many valuable and interesting historical portraits. The custom-house and post-office are combined in a fine granite structure. The medical college is a characteristic specimen of Egyptian architecture. Near this building is the Brockenbrough house, now used as a school, but during the war occupied by Jefferson Davis in his official capacity as president of the confederacy.

RICHMOND, Charles Henry Gordon Lennox, Duke of, b. Whitehall, England, 1818; eldest son of the 5th duke of Richmond; graduate of Christ-church, Oxford, 1839; capt. in the army 1844, m.p. for West Sussex 1841–60, representing the conservative interest. He performed the duties of aid-de-camp to the duke of Wellington, and viscount Hardinge; has been president of the poor law board, and privy councilor. In 1860 he succeeded his father as duke of Richmond; became duke of Gordon 1876. He was president of the board of trade in Disraeli's cabinet, 1867–8, leader of the conservative party in the house of peers 1870, and in the 2d Disraeli ministry 1874, became lord president of the council. He favored the bill for abolishing church patronage in Scotland, and in 1875 introduced the agricultural holdings bill.

RICHMOND, Countess of. See Beaufort, Margaret.

RICHMOND, Dean, 1804–66; b. Vt.; received only a common school education. but acquired much information by reading. At an early age he removed to New York, became interested in political matters, was an active democrat, and obtained great influence in the state politics. He refused to accept any public office for himself. While a boy he entered the business of manufacturing salt at Salina, N. Y., and in 1842 opened a produce business in Buffalo. Here he became wealthy, and held office in several corporations. In 1853 he was made vice-president, and in 1864 president of the New York Central railroad.

RICHMOND, Legh, 1772–1827; b. Liverpool; graduated at Trinity college, Cambridge, 1794; ordained in 1797; became curate in the Isle of Wight, 1798; chaplain to the Lock hospital, London, 1805, and the same year rector of Turvey. He was an earnest evangelical preacher. He published as tracts *The Dairyman's Daughter, The Negro Servant; The Young Cottager,*—(*Annals of the Poor*). Before 1849, four million of copies of the *Dairyman's Daughter* had been issued in 19 languages. He published also *Fathers of the English Church* and *Domestic Portraiture.*

RICHTER, Jean Paul Friedrich, better known as "Jean Paul," a German humorist and sentimentalist of the greatest singularity, hence called by his countrymen *Der Einzige* (the unique), was b. at Wunsiedel, in Bavaria, Mar. 21, 1763. His father, who was a poor schoolmaster at the period of Richter's birth, subsequently became parish priest at Schwarzenbach, on the Saale; but his circumstances always remained straightened, and he died burdened with debt, while his son was attending the gymnasium at Hof. Nevertheless, Richter went to the university of Leipsic in 1780 to study theology, which did not prevent him from roving freely over the whole circle of literature. The exact extent of his scholarly acquirements cannot well be ascertained; his studies were never systematic, and it is probable that he was not deeply read in any single branch of learning, but he carried in his head or in his note-books a vast confused miscellany of facts, literary, scientific, philosophical, and theological, and strewed them with oriental profusion over the pages of his works, where they do duty as metaphors. or illustrations after the most grotesque and wonderful fashion. The English satirists, Pope, Swift, and Young, appear to have been special favorites with him; and among his own countrymen, Hamann and Hippel. But the most marvelous thing about his student-life was not the extent or variety of his reading, but the fact that he had the heart to read at all! During the whole time he was plunged in the most miserable poverty. He could hardly get a single private pupil, and passed many a day without tasting food. Hunger was, in truth, his constant companion. In desperation he betook himself to literature for a subsistence, but it was long before he won recognition. His first composition, *Das Lob der Dummheit* (The Praise of Folly), modeled on the *Moriæ Encomium* of Erasmus, could not find a publisher; his second, written, he tells us, while he was surrounded by "unpaid debts and unsoled boots," *Grönländische Processe* (Greenland Lawsuits, 2 vols., Berl. 1783–85), did succeed in getting itself published but not read, and at length the heroic fortitude of Richter gave way. In 1785 he fled from the city to avoid incarceration for debt, and took refuge with his mother at Hof. Here his circumstances were little better; and in 1786 he was glad to accept a tutorship at Topen in the family of Herr von Oerthel. In 1790, at the request of several families of Schwarzenbach, he removed thither to take charge of the education of their children, and lived in this way as a private schoolmaster for some years. Meanwhile, he had not given up authorship. In 1788, appeared at Gera his *Auswahl aus des Teufels Papieren* (Selection from the Devil's Papers), which, however, in spite of its captivating title, did not prove more popular than its predecessors. Richter seemed destined to failure as a writer. His sarcastic, far-glancing, and grotesquely sportful humors were so unlike anything else in literature, and so oddly, not to say extravagantly, expressed, that the mass of readers could make nothing of them at all, and perhaps charitably regarded the author as crazy. But in 1793 the turning-point in his fortunes and fame occurred. In that year, a work which he had published at Berlin, *Die Unsichtbare Loge* (The Invisible Lodge), and which was a sort of romance based on his experience as a schoolmaster, proved unexpectedly successful, and Richter began to grow a little more familiar with the sight of gold. It was followed by *Hesperus* (4 vols., Berl. 1794), the work by which he is perhaps best known out of Germany; *Quintus Fixlein* (Baireuth, 1796); *Biographische Belustigungen unter der Gehirnschale einer Riesin* (Biographical Recreations under the Cranium of a Giantess, Berl. 1796); *Blumen-, Frucht-, und Dornenstücke* (Flower, Fruit. and Thorn Pieces, 4 vols., Berl. 1796–97), the opening chapter of which contains his magnificent "Dream of the Dead Christ," translated into English by Carlyle; *Jubel-senior* (The Parson in Jubilee, 1797), and *Das Campanerthal* (Erfurt, 1798), a work on the immortality of the soul, which attracted the notice and won for its author the friendship of Herder. Richter was now one of the greatest celebrities of Germany; his books had become quite the rage, especially among educated women. He himself, too, was personally a great favorite; there was something in his conversation and manner so winning, joyous, and charmingly tender, that it excited not only friendship but love. We read of one brilliant woman, Charlotte von Kalb, who actually sought to obtain a divorce in order that she might marry Richter; and of another who committed suicide because he would not return her unlawful passion. This last incident affected Richter profoundly. He was not only perfectly innocent in all his relations with the other sex, but pure and high-minded to a degree, and he had remonstrated with the unhappy maiden in the most wise and delicate manner. In 1801, after he had become famous, he married Caroline Mayer, daughter of prof. Mayer of Berlin, and with his young wife traveled about Germany a good deal, visited Goethe and Schiller, with neither of whom, however, he became intimate, and formed a closer acquaintance with old Gleim, Wieland, etc.; but ultimately settled at Baireuth, in Bavaria, where he devoted his time with the most honorable assiduity to work. His aërial, fantastic, many-hued creations—his solemn images of glory and gloom—his *riant* humors—his burlesque speculations on life, manners, and, indeed, on the *omne scibile*—his innumerable descriptions of nature, soft-glittering as with morning dew, flowed from him as from inexhaustible fountains. The productions belonging to his later period of a humorous kind are: *Titan* (4 vols., Berl. 1800–3), considered by Richter himself his greatest work; *Flegel Jahre* (happily rendered by Carlyle "Wild Oats," 4 vols., Tüb. 1804–5); *Katzenberger's Badereise* (2 vols., Heidelb. 1809); *Des Feldpredigers Schmelzle Reise nach Flätz* (Tüb. 1869); and *Der Komet, oder Nikolaus Markgraf* (3 vols., Berl. 1820–22). Among works of a professedly reflective or philosophical character (though the elements of humor and poetry are by no means absent), we may mention his *Vorschule der Aesthetik* (3 vols., Hamb. 1804); *Levana oder Erziehungslehre* (Brunswick, 1807), a treatise on education; and numerous other pieces. Richter died Nov. 14, 1825. In his latest years he was afflicted with a decay of his physical powers, and in his last year with total blindness. The death of his son Max, in 1821—a youth of great promise—inflicted an incurable wound on his heart.—See *Wahrheit aus Jean Paul's Leben* (Bresl. 1826–33), a work begun by Richter himself; Döring's *Leben und Characteristik Richters* (2 vols., Leip. 1830); Spazier's *Jean Paul Friedrich Richter ein Biographischer Commentar zu dessen Werken* (5 vols., Leip. 1833). Some of his pieces have been translated into English by Carlyle and others; Carlyle has also given us two admirable essays on the life, writings, and genius of the man, to which we refer our readers.

RIC'IMER, d. 472; a general of barbarian origin, who was virtually master of the Roman empire from 460 to his death, enthroning and deposing several emperors. He dethroned Avitus in 456, had Majorianus assassinated in 461, Vibius Severus in 465, and Anthemius 472. Olybius, the last emperor whom he raised to the throne, died the same year with Ricimer.

RI'CINUS. See Castor-oil Plant.

RICKAREES, or Aricaras, a tribe of Pawnee Indians, originally allied to the Platte river Pawnees. They now number from eight to nine hundred, having decreased rapidly since the coming of the whites. They were badly defeated by the Dakotas in the early part of the century; and in 1823, having committed outrages on whites, were defeated and dispersed by troops. In 1825 a treaty was made with them, and for some years they left the Missouri region, but returned and remained near fort Berthold in league with the Mandans and Minnetarees. They are now in Dakota and Montana on a large reservation set out for them in 1870. Very little advance in civilization has been made, and they have had less benefit from the establishment of missions than many Indian tribes.

RI'CKETS, or Rachi'tis (from the Gr. *rhachis*, the spine, because a peculiar form of spinal curvature results from the affection), is regarded by some writers as a special disease of the bones, and by others as merely one of the various forms of scrofula. Whichever view be correct, there can be no doubt that the general symptoms in rickets are closely allied to those in scrofula, and that the same general plan of treatment is equally useful in both affections. The characteristic symptom in rickets is the imperfect development, atrophy, softness, and consequent distortion of some or many of the bones. The bones thus affected consist of a sort of gelatinous tissue, which will bend without breaking; and they are so soft that they may be cut with the knife. On microscopico-chemical examination, the structural arrangement of the bone is found to be unaffected, while there is a great deficiency of the earthy salts to which the normal bones owe their firmness. While 100 parts of healthy bone contain about 32 per cent of organic matter, and 68 per cent of inorganic matter, or earthy salts, the proportions are altogether reversed in rickets. Thus, in this disease, Marchand found 79.4 per cent of organic matter, and 20.6 per cent of earthy salts in a femur; while Ragsky found 81.12 per cent of organic matter, and only 18.88 of earthy salts in a humerus: thus showing that these bones contained less than one-third of the normal quantity of earthy salts. The weight of the body acting on bones thus constructed causes them to bend, and the thighs or shins are abnormally arched, or the spine is curved, or, in slighter cases, only the normal form of the ankle is modified. In aggravated cases, the chest is so affected as to give rise to the condition known as *pigeon-breasted;* the lower jaw is imperfectly developed, and the teeth project; and the pelvis becomes so altered in form as to render future childbearing in the highest degree perilous. Rickets is exclusively a disease of childhood, and generally attacks the children of the poor.

The treatment must be mainly directed to the improvement of the general health. Free exposure to pure bracing air, sponging with sea-water, or sea-bathing, if the little patient can bear it, an abundance of animal food, cod-liver oil, iron, and quinia, include all that need be said about general treatment. Dr. Druitt recommends a jelly containing phosphate of lime (with the view of restoring to the bones the salt in which they are specially deficient). It is well worthy of further trial, and may be prepared as follows: Boil about four ounces of ivory-dust in water for ten minutes; then strain off the water and throw it away with the impurities which it has taken up. Add more water, in which the dust should be stewed till the jelly is extracted, and the dust itself is soft enough to crush between the teeth. Lemon-juice, wine, sugar, or other flavoring ingredients may be added; and the softened ivory-dust should be eaten with the jelly.

When a child with crooked legs is brought to a surgeon, he must carefully ascertain whether the crookedness depends on mere relaxation of the joints, or whether it lies in the bones themselves. In the former case the child will probably grow up straight when his general health improves; whereas in the latter case (if the femur or tibia is absolutely bent), the surgeon must give a very guarded opinion.

RICKETTS, JAMES B., b. New York; graduate of West Point 1839, became 1st lieut. of artillery 1846, served in the Mexican war and was made capt. in 1852. In the war of the rebellion he was taken prisoner at the first battle of Bull Run and confined at Richmond 8 months. Before the second battle of Bull Run he was exchanged, afterward promoted to brig.gen., and was wounded in that engagement. He commanded gen. Hooker's corps at Antietam after that officer was disabled, and was actively engaged throughout the Richmond and Shenandoah campaigns. He was brevetted for bravery at Bull Run, Cold Harbor, and Cedar Creek; maj.gen. 1865; retired 1867.

RICKMAN, THOMAS, a distinguished architect, was born at Maidenhead in 1776. He was unsettled in early life, and tried several employments both in London and Maidenhead. He managed his father's business of druggist for some time, and afterward became a clerk in an insurance office. He seems to have always had a love for architecture, and to have studied it carefully. In 1808 he began to give his full attention to it, and wrote the classification of Gothic styles, which has rendered him famous. He first pointed out the features which distinguish the different periods of that style. He divided it into four periods, and called them Norman, early English, decorated, and perpendicular (q.v.), and these names and the dates he assigned to them are still the most frequently used.

Rickman became after this an architect in Birmingham, and was employed to design a great many buildings, especially churches. He died in March, 1841. His work is called *An Attempt to Discriminate the Styles of Architecture in England from the Conquest to the Reformation.* It was first written for Smith's *Panorama of Science and Art,* and has passed through several editions; that by Parker of Oxford (1847) is the best.

RI'COCHET, in artillery, is the bounding of a shot along the ground, which takes place when a gun is fired low. Ricochet firing is found extremely useful both in its actual and moral effect in clearing the face of a ravelin, bastion, or other rather long line of fortification. If well directed the ricochet shot bounding along will dismount guns, scatter the gunners, and greatly intimidate the garrison. Vauban first introduced ricochet firing at the siege of Philipsburg in 1688. The defense against this sort of attack consists in earthen traverses along the threatened line, or in a bonnet (see FORTIFICATION) at the point of parapet nearest the enemy. In the field, ricochet, where the shot or shell is made to bound forward at least ten times, produces most disastrous and demoralizing effects on masses of cavalry and infantry, whom it hews down in long lines.

RICORD, PHILIP, a distinguished French physician, was the son of a wealthy shipowner, and was born Dec. 10, 1800, at Baltimore, whither his father had gone in 1790 to repair his fortunes, which he had lost under the India company. He came in 1820 to Paris, where he was attached in succession to the Hôtel-Dieu under Dupuytren, and to the Pitié under Lisfranc. He graduated as doctor in medicine in 1826; but was unable, from the scantiness of his private means, to begin practice in Paris. His professional career, therefore, commenced at Olivet, near Orleans, and was thence transferred to Crouy-sur-Ourcq, where he rapidly rose to distinction as a practitioner. In 1828 he returned to Paris, where he delivered two annual courses of lectures at the Pitié on surgical operations; and was appointed surgeon-in-chief to the hospital for venereal diseases. This post he held with brilliant success till his retirement in Oct., 1860. It was here that he won his world-wide reputation in the specialty which he had chosen—a reputation which he owed to his combination of accurate physiological and pathological knowledge with great manual dexterity as a surgeon, and felicitous inventiveness and resource as a physician. He did much to improve the classification of enthetic diseases; and at the venereal hospital delivered annually, from 1834, a course of lectures on syphilology, for which a special amphitheater was granted to him. For his suggestions on the cure of varicocele and on the operation of urethro-plasty he received in 1842 one of the Montyon prizes. M. Ricord's practice is the most extensive and the most lucrative in Paris, insomuch that while an inmate of the debtors' prison at Clichy, he was literally besieged by crowds of patients. He has been since 1850 member of the academy of medicine (section of surgical pathology); member of the surgical society; and consulting.surgeon to the dispensary of public health. In 1862 he was appointed physician in ordinary to prince Napoleon; and in 1869 consulting surgeon to the late emperor; having already on Aug. 12, 1860, been raised to the distinction of commander of the legion of honor. His works are numerous, the more important of them being these: *On the Employment of the Speculum Biviale* (1833), invented by himself; *On the Blennorrhagia of the Female* (1834); *On the Employment of Mercurial Ointment in the Treatment of Erysipelas* (1836); *The Monography of Chancre* (in which he gives a detailed exposition of his own system); *Theory of the Nature and Treatment of Epididymitis* (1838); *Treatise on Venereal Maladies* (1838); *On Blennorrhagic Ophthalmia* (1842); *Iconographical Clinic of the Venereal Hospital* (1842–51); and *On Syphilization and the Contagion from Secondary Accidents* (1853). He has also contributed to the medical journals a multitude of memoirs, observations, researches, and communications on his specialty. His latest works are those entitled *Letters on Syphilis* (3d ed. 1863), and *Lectures on Chancre* (2d ed. 1860), both remarkable for their fluency and grace of style.

RIDDLE (Ger. *räthsel*), a paraphrastic presentation of an unmentioned subject, the design of which is to excite the reader or hearer to the discovery of the meaning hidden under a studied obscurity of expression. In the present day the riddle is a mere *jeu d'esprit*—a sort of witty pastime for idle people; we only meet with it under the form of conundrum (q.v.), but anciently—and its antiquity is very great—it held a far higher place, and was put to far more important uses, although in its inferior phase of conundrum it was likewise a part of the intellectual entertainment at Greek and latterly at Roman banquets. Among the easterns it naturally associated itself with their symbolical modes of thought, and was also, as it still is, abundantly employed for didactic purposes. The so-called Proverbs or sayings attributed to Solomon frequently assume the form of riddles. Josephus relates, on the authority of Dius the Phenician historian, and of Menander of Ephesus, that Hiram king of Tyre and Solomon had once a contest in riddles or dark sayings, in which Solomon first won a large sum of money from Hiram, but ultimately lost it to Abdemon, one of Hiram's subjects—a curious instance of philosophical gambling. Every reader of the Old Testament is familiar with the riddle which Samson proposed to the Philistines, and the "enigmas" (as the Septuagint has it) that the queen of Sheba proposed to Solomon, though it is perhaps doubtful if the latter were more than hard or difficult questions plainly put. The riddle is found in the Koran, and several books of riddles exist in Arabic and Persian. It would appear that they were also known to the ancient Egyptians, while among the Greeks they were allied in the earliest times with the *oracula*, or mystic utterances of the inspired priests, and were generally, as is the case with Samson's riddle, in verse; but in Greece they first came into vogue about the time of the "seven wise men," one of whom, named Kleobulos, as also his daughter Kleobuline, was celebrated for the composition of metrical riddles (*griphoi*), some of which are still remembered. Even the greater poets did not refuse to introduce the riddle into their writings, or to devote whole poems to the subject—as, for example, the *Syrinx*, commonly ascribed to Theocritus. Homer, according to a statement in Plutarch, died of chagrin at not being able to solve a riddle; and the riddle of the Sphinx (see Œdipus) is probably the most celebrated in the whole circle of philosophical puzzles. Among the Romans professional riddle-makers did not make their appearance till the latest period of Roman literature, the reason assigned for which is the superior gravity and earnestness of the Roman genius, which, it is said, did not easily find pleasure in such modes of intellectual activity. Appuleius wrote a *Liber Ludicrorum et Griphorum*, but it is no longer extant, and almost the only name we can fix upon is a certain Cælius Firmianus Symposius, whose riddles, comprising a hundred hexametrical triplets, are termed by Aldhelmus (8th c.), apparently with justice, *carmina inepta*.

The riddle—but more perhaps as an amusement for the baronial hall on winter nights, or for the monastic mess-room, than as a serious intellectual effort—was much cultivated during the middle ages. This character of lively or amusing puzzle it has ever since for the most part retained. Many specimens of what would now be termed "riddle" or "conundrum books" exist in French, English, and German collections of manuscripts, and were printed at an early period. One of these, entitled *Demands Joyous*, which may be rendered "amusing questions," was printed in English by Wynkin de Worde in 1511. Many of these "joyous demands" are simply coarse jests; but others, again, illustrate the simple, child-like religious belief of mediæval Christendom—e.g., demand: "What bare the best burden that ever was borne?" Response: "The ass that carried our lady when she fled with our Lord into Egypt." Some are really fitted to excite risibility—e.g., demand: "What is that that never was and never will be?" Response: "A mouse's nest in a cat's ear."—"What is the worst-bestowed charity that one can give?" "Alms to a blind man; for he would be glad to *see* the person hanged that gave it to him." The reformation, at least in Protestant countries, checked, if it did not wholly stop, the merry pastime of riddle-making; but in the 17th c. it began to creep into favor again. Le père Ménestrier, a learned Jesuit, wrote a grave treatise on the subject; and in France riddles soon rivaled in popularity the madrigals and sonnets of the period. The abbé Cotin was a famous fabricator of riddles, and published a *recueil* of his own and those of his contemporaries, preceded by a dissertation, in which he modestly dubbed himself *Le Père de l'Enigme* (the father of the riddle): but, as a French critic remarks, posterity has not recognized his paternity. In the 18th c. the taste for the manufacture of riddles continued to increase, and most of the brilliant French *littérateurs*, such as Boileau, Voltaire, and Rousseau, did a little in this line, until, finally, the *Mercure de France* became a fortnightly repository of riddles, the solution of which was sufficient to make a reputation in society. In Germany Schiller gave a broader development to the riddle. In his hands it once again became something grave and sibylline, and attained in expression a high degree of literary beauty and force. A good collection of the best riddles is to be found in Ohnesorgen's collection, entitled *Sphinx* (6 vols. Ber. 1833).

RIDDLE, JOSEPH ESMOND, 1804–59; b. England; educated at Oxford. He took orders in the English church, was for some time curate at Harrow, and from 1840 to his death, rector of a church in Leckhampton. His best-known work is *A Copious and Critical Latin-English Lexicon*, which he edited, in conjunction with T. K. Arnold, from the German of Freund. He published *An English-Latin Dictionary* in 1849.

RIDGE, the upper angle of a roof, usually covered with lead or zinc, and sometimes with stone or tile. Ridges are often ornamented with a cresting or running design, and recently cast-iron has been much used for this purpose.

RIDGELY, JAMES LOT, b. Baltimore 1807; educated at St. Mary's college; studied law; admitted to the bar in 1828, and began practice at Baltimore. He has held many local political offices, the most important of which was the collectorship of internal revenue, and was for some time at the head of the city educational system. He has been prominent in the order of odd fellows, in which he has occupied very high official positions, and has published several hand-books and periodicals. Since 1855 he has been president of an insurance company.

RIDING (Saxon, *trithing*, third part), a term applied to three parts into which the county of York is divided, termed respectively East, West, and North Riding. A similar division existed in several other counties in the Anglo-Saxon period; there were the *laths* of Kent, the *rapes* of Sussex, the *parts* of Lincoln. The trithing, lath, or rape was formed of three or more hundreds, and presided over by a trithing-man or lath-grieve. In *Domesday Book* we find Yorkshire divided, as at present, into three ridings, and subdivided into wapentakes. See WAPENTAKE.

RIDING-MASTER, an officer in the cavalry, military train, and artillery, whose duty it is to instruct the officers and men in the management of their horses. He is most commonly selected from the ranks; his pay is 9s. a day, rising by length of service to 10s 6d. and 12s.; besides which he receives £7 per troop per annum for riding-house expenses; and he is believed to make some profit out of this allowance. The riding-master has the relative rank of lieutenant, and, after an aggregate service of 30 years, including at least 15 years as riding-master, he has the right to retire on 10s. a day, with the honorary rank of captain.

RIDLEY, NICHOLAS, one of the most noted leaders of the reformation in England in the 16th c., was a native of Northumberland, and b. about the commencement of the century. He was educated at the foundation-school of Newcastle-upon-Tyne; and subsequently at Pembroke hall, Cambridge. He became a fellow of this college in 1524, and ultimately president. The spirit of the reformation had already begun to penetrate the universities both of Oxford and Cambridge. Tyndale and Bilney had taught the new doctrines in the latter place; and Ridley, no less than Cranmer and Latimer, all Cambridge students about the same period, had probably caught something of their spirit. This reforming tendency was greatly strengthened by a tour on the continent of Europe, which he undertook on the completion of his studies. He encountered some of the most active reformers abroad, and after a three years' absence, he returned, with his principles firmly grounded in favor of the new course of things. He became proctor to the university of Cambridge, and in this capacity protested against the claims of the papal see to supreme ecclesiastical jurisdiction in England. He was also chosen public orator, and, under the patronage of his friend Cranmer, advanced first to be one of the king's chaplains, and then, in 1547, nominated bishop of Rochester. He distinguished himself by his vehement denunciations of the idolatrous use of images and of holy water, and very soon became one of the most prominent, as he remained one of the most consistent and inflexible, supporters of the reformed doctrines. He joined actively in the measures of Edward VI's reign, and on the deprivation of Bonner, bishop of London, Ridley became his successor, three years subsequent to his elevation to the see of Rochester. In this high position he distinguished himself by his "moderation, his learning, and his munificence." He earnestly promoted the reformation, yet without bigotry or intolerance; he exerted himself in the foundation of Christ's hospital, and of the hospitals of St. Bartholomew and St. Thomas in Southwark, the two latter of which have become eminent as schools of medicine—the former as a school of classical and general instruction. He assisted Cranmer in the preparation of the 41 articles, afterward reduced to 39. On the death of Edward VI. he warmly espoused the unfortunate cause of lady Jane Grey; and on its speedy failure, and the accession of Mary, his known connection with it, as well as his general activity in the cause of the reformation, exposed him to the vengeance of the papal party, again ascendant. He was committed to the Tower in 1553, and in the subsequent year, when a convocation was convened at Oxford for the discussion of the doctrine of transubstantiation, he was removed thither along with Cranmer and Latimer, in order that he might engage in the discussion. It was not to be expected, however, that any good would issue from such a step as this. The discussion proved a mere pretense; the reformers were adjudged defeated and obstinate heretics, and condemned to suffer at the stake. On Oct. 16, 1555, Ridley was led forth to execution, along with his friend and fellow-reformer, Latimer. He suffered in front of Balliol college, cheerful, steadfast, and consistently enduring as he had been throughout his life. He was, according to Burnet, one of the ablest of all who advanced the reformation in England. His character is pure, elevated, and self-denying. Foxe says of him he was "wise of counsel. deep of wit, benevolent in spirit." His gentleness wins our sympathy, while his scholarly and calm intrepidity excite our admiration.

RIDOLFI, Roberto, b. Italy; established himself in London as a banker in 1554. He became a secret agent for the pope and several continental sovereigns. He participated in several conspiracies against Elizabeth. He visited Madrid in 1571, and proposed to Philip II. a plan for assassinating Elizabeth. This plan he claimed to be the work of the English Roman Catholics, and to have received the sanction of the pope—of which, however, there is no evidence except his assertion. The duke of Alva opposed it, but Philip partially approved it. The plot was discovered in England, and the principals punished.

RIE'DESEL, Friedrich Adolph, Baron von, 1738–1800; b. Germany; studied at Marburg. He served in the 7 years' war, and in 1776 took command of 4,000 Brunswick troops, hired by Great Britain for service against the American colonies. He assisted in the capture of Ticonderoga, and in the British success at Hubbardton; was made prisoner at Burgoyne's surrender, and was exchanged in 1780. He was appointed lieut.gen. in 1787, and commanded the Brunswickers in Holland. His wife, Frederica Charlotte Louisa, 1746–1808, b. Prussia, daughter of Massow, the Prussian minister, came with her husband to America, and has left an interesting account of their American adventures.

RIE'GO Y NUÑEZ, Rafael del, 1785–1823; b. Oviedo, Spain. He joined in the patriot movement which followed the making of Jerome Bonaparte king of Spain, and in 1808 was captured by the French. He was a prisoner until 1814, when he visited Germany and England. In 1820 he was the chief in the popular agitation which brought about the restoration of the Spanish constitution of 1812, and in 1823 was president of the cortes. He bitterly opposed French intervention, and when that took place was captured, tried as a traitor, and put to death at Madrid. His body was quartered. In his honor was composed the *Hymn of Riego*, a popular national song in the days of the republic.

RIENZI, Cola di, the famous Roman tribune, was b. at Rome in 1313. His parentage was humble, his father being a tavern-keeper, named Lorenzo (by abbreviation Rienzo), and his mother a washerwoman. Until his twentieth year he lived among the peasants of Anagni; then he returned to his native city, where he studied grammar and rhetoric, read and reread the Latin historians, philosophers, and poets (Greek was scarcely yet known in Italy), and excited his imagination, while at the same time he colored his speech with the prophetic enthusiasm of the inspired writers. The assassination of his brother by a Roman noble, whom he found it impossible to bring to punishment, is considered to be the incident that finally determined him to deliver the city, as soon as he was able, from the barbarous thralldom of the barons. He assumed the significant title of "consul of orphans, widows, and the poor." In 1343 he was appointed by the heads of the Guelph party spokesman or orator of a deputation sent to the papal court at Avignon to beseech Clement VI. to return to Rome in order to protect the citizens from the tyranny of their oppressors. Here he formed a close friendship with Petrarch, through whose assistance he obtained a favorable hearing from his holiness, who appointed him notary to the city chamber. In April, 1344, Rienzi returned home, and sought to obtain the countenance of the magistrates in his ideas of reform; but reform, he found, was impossible without revolution; yet he did not *conspire*, properly speaking, to the very last moment. During three years he loudly and openly—perhaps even ostentatiously—menaced the nobles, for the enthusiasm of Rienzi for a nobler and juster government, though sincere, was showy and vain. The reason why the nobles took no steps to crush him was because they thought him mad. At last when Rienzi thought he could rely on the support of the citizens he summoned them together on May 20, 1347, and surrounded by 100 horsemen and the papal legate he delivered a magnificent discourse, and proposed a series of laws for the better government of the community, which he termed *il buono stato*, and which were unanimously approved of. The aristocratic senators were driven out of the city, and Rienzi was invested with dic tatorial power. He took the title of "tribune of liberty, peace, and justice," and chose the papal legate for his colleague, but reserved to himself the direction of affairs, after having, however, suggested the institution of a syndicate, to which he should be responsible. The pope confirmed the eloquent dictator in his authority; all Italy rejoiced in his success, and foreign lands, even warlike France (according to Petrarch), began to dread the reviving majesty of the eternal city. A bright dream now seems to have flashed across Rienzi's imagination—the unity of Italy and the supremacy of Rome! Every great Italian has dreamed that dream from Dante to Mazzini. Rienzi dispatched messengers to the various Italian states, requesting them to send deputies to Rome to consult for the general interests of the peninsula, and to devise measures for its unification. These messengers were everywhere received with enthusiasm, and on Aug. 1, 1347, 200 deputies assembled in the Lateran church, where Rienzi declared that the choice of an emperor of the holy Roman empire belonged to the Roman people, and summoned Ludvig of Bavaria and Karl of Bohemia, who were then disputants for the dignity, to compear before him. The step was wildly impolitic. Rienzi had no *material* power to enable him to give efficacy to his splendid assumption. The pope was indignant at the transference of authority from himself to his subjects; and the barons, taking advantage of certain ceremonial extravagances which the dictator had committed, and which had diminished the popular regard for him, gathered together their forces, and renewed their devastations. After some ineffectual resistance Rienzi resigned his functions, weeping all the while, and withdrew from Rome, which was entered by the barons two days after. His tenure of power had lasted only seven months. In the solitudes of the Neapolitan Apennines, where he found refuge, Rienzi would seem to have recovered his enthusiasm and his faith. Regarding his fall as a just chastisement of God for his love of worldy vanities he joined an order of Franciscan hermits, and spent nearly two years in exercises of piety and penitence—all the while, however, cherishing the hope that he would one day "deliver" Rome again. This ambition to play a distinguished part made him readily listen to a brother-monk, who, about the middle of 1350, declared that, according to the prophecies of Joachim of Flores, of Cyrillus, and of Merlin, Rienzi was destined, by the help of the emperor Karl IV., to introduce a new era of happiness into the world. Rienzi betook himself at once to Prague, and announced to the emperor that in a year and a half a new hierarchy would be established in the church, and under a new pope Karl would reign in the west and Rienzi in the east. Karl, not knowing very well what to say in reply to such language, thought it safest to put the "prophet" in prison, and then wrote to inform his friend the pope of the matter. In July, 1351, Rienzi was transferred to Avignon, where proceedings were opened against him in reference to his exercise of tribunitial power. He was condemned to death, but his life was spared at the earnest entreaties of Petrarch and others; and the next two years were spent in an easy confinement in the French papal city. Meanwhile the state of matters at Rome had become worse than ever. The great families were even more factious, more anarchical, more desperately fond of spilling blood than formerly; and at last Innocent VI. sent cardinal Athornoz to re-establish order. Rienzi was also released from prison, and accompanied the cardinal. A residence was assigned him at Perugia; but in Aug., 1354, having borrowed money, and raised a small body of soldiers, he made a sort of triumphal entry into Rome, and was received with universal acclamations. But misfortune had impaired and debased his character; he abandoned himself to good living, and his once generous sentiments had given place to a hard, mistrustful, and cruel disposition. The barons refused to recognize his government, and fortified themselves in their castles. The war against them necessitated the contraction of heavy expenses; the people grumbled; Rienzi only grew more severe and capricious in his exactions and punishments. In two months his rule had become intolerable, and on Oct. 8 an infuriated crowd surrounded him in the capitol, and put him to death with ferocious indignities.

RIE'SENGEBIRGE (giant mountain), a mountain range about 23 m. long by about 12 m. broad, between Bohemia and Prussian Silesia. See BOHEMIA.

RIE'SI, a t. of Sicily, in the province of Caltanisetta, and 13 m. s. from Caltanisetta. It is situated at the base of a mountain of the same name, not far from the left bank of the Salso. There are sulphur mines in the mountain. Pop. '71, 11,548.

RIE'TI (ancient, *Reate*), a city of central Italy, in the province of Perugia in Umbria, is situated at the foot of a hill, on the banks of the Velino, 45 m. n.e. of Rome. It is walled, its streets are regular, and it has a fine cathedral, and many benevolent institutions. It is the seat of an archbishop. Rieti was a noted city of the Sabines. Pop. 12,900.

RIFF, THE a portion of the coast of Morocco which extends from Tangier on the w. to near the western frontier of Algiers, having a length of about 210 m., with a breadth of 58. The name, in the Berber language, which is that of the inhabitants, signifies a mountainous and rugged coast. The Riff mountains, which stretch along near and parallel to the coast, are green and wooded, and are here and there intersected transversely by fertile valleys or deep ravines, each of them possessing its brook or rivulet, which descends to the Mediterranean. The Riff region is separated from the parallel mountain chain s. of it by an extensive, fertile, and well-watered plain, in which stands the city of Fez. The inhabitants of the Riff are almost wholly Berbers, who are employed in feeding and breeding cattle, fishing, and occasional piracy. On account of the injuries inflicted by them on merchant vessels, most of the maritime states of Europe agreed to pay an annual sum as quit-money. However, in 1828, Austria declined further payment of the tax. A Venetian vessel was seized by the pirates, in the harbor of Rabat, but the arrival of an Austrian fleet off the port produced restitution of the ship and its cargo, as well as the formal renunciation of all further claims. France followed the same course by declaring war against the sultan of Morocco, and obtained compensation, in 1844, since which period piracy has much diminished. Its example was followed by the Spaniards in 1859. The sultan, however, had always discountenanced piracy, but his authority in the Riff was too weak to compel obedience.

RIFLE-BIRD, *Ptiloris Paradiseus*, a bird of the family *upupidæ*, with a long curved bill, and in size about equal to a large pigeon. It inhabits the s.e. districts of Australia, and is found only in very thick "bush." The male is regarded as more splendid in plumage than any other Australian bird. The upper parts are velvety black, tinged with purple; the under parts velvety black, diversified with olive-green. The crown of the head and the throat are covered with innumerable little specks of emerald green, of most brilliant luster. The tail is black, the two central feathers rich metallic green.

RIFLED ARMS were invented for the purpose of remedying certain defects essentially connected with cylindrical smooth-bore guns. These defects, which are chiefly owing to atmospheric resistance, showed themselves in the erratic motion of the ball, especially when fired at a long range, and arose from the following causes: *First,* The ball never fitted tightly, and, in consequence of this, its center was below the center of the bore. A portion of the explosive force of the powder escaped over the top of the bullet, and was not only wasted, but exercised a downward pressure on the ball, tending to squeeze it *into* the under side of the barrel, and so great was this pressure that in guns of soft metal, as brass, a perceptible dint was produced after a few rounds. Another and more important consequence of the looseness of the ball was that the action of the powder on it was necessarily irregular, and its resulting motion along the barrel was a series of oblique impacts, now against one side, now against the other, and the direction of its motion after expulsion was necessarily not in line with the axis of the barrel, and depended upon the side of the barrel with which it was last in contact. *Secondly,* Balls can never be perfectly homogeneous, and the violent and sudden pressure of the exploded powder produces a slight change of shape; consequently the center of gravity can never accurately coincide with the center of the sphere, the air resists its forward motion unequally, and true flight is precluded. *Thirdly,* As a consequence of the friction of the ball against the sides of the barrel, it acquires a rotatory motion, the direction of its rotation after expulsion being determined by the particular point of the muzzle with which it was last in contact. Thus, if it finally touched the top or bottom of the muzzle, the plane of rotation of the anterior surface of the ball would be in line with its progressive motion, and the rotation would be in an upward or downward direction; if it last rebounded from the right side, the plane of rotation would be in line with its path, and the rotation of the anterior surface from left to right, and so on. The ball, in its rapid flight, compresses the air in front, and produces a vacuum behind; the denser because more compressed, air in front, attempts to rush round the sides of the ball to fill up the vacuum. Now let us suppose that the ball, while in rapid advance, is also revolving in a horizontal plane, and from left to right, the left side, whose rotation *conspires with* the motion of translation, resists, by its friction, the attempt of the air to reach the vacuum by that side; while the right side, whose rotation is against the motion of translation, conspires to aid the air in reaching the vacuum. It follows from this that the air is denser in front of the left side than in front of the right; its resistance on the left side is greater than that on the right, and the ball, in consequence, is deflected toward the side on which the resistance is least (toward the right in this instance). If the ball struck the top of the muzzle, its revolution would be in a vertical plane in line with the barrel, and in an upward direction, under which circumstances the ball would tend, first, downward from the first reason, and then upward from the third; while, if it struck the bottom of the muzzle, the contrary would be the case. These aberrations of the ball from its true theoretical path, as was evident to artillerists, could never be wholly annihilated while smooth-bores were used, and they set themselves to discover how they might be counteracted. It occurred to them that this could best be managed by securing that the plane of rotation of the ball should be at right angles to its motion of translation, as the irregularities in its structure, which produce aberrations of the first and second kind, would thus act equally in all directions, producing an exact counterbalance, while the aberration from the ball's rotation would wholly disappear; and the constancy of the vertical transverse position of the plane of the ball's rotation was obtained by making one or more spiral grooves along the interior of the barrel.

As early as 1498 the citizens of Leipsic possessed the germ of the future rifle, for their arms had a grooved bore, but the grooves were straight. Not many years after, in 1520, Augustin Kutter (or Koster) of Nuremberg was celebrated for his rose or star-grooved barrels, in which the grooves had a spiral form. It took its name from the rose-like shape of the bore at the muzzle; and, setting aside superiority of workmanship subsequently-developed, Kutter's arm was the veritable rifle, and to him, therefore, so far as history shows, is due the invention of this terrible weapon, which reduces the flight of the projectile to a question of the individual skill of the marksman. The spiral groove gives to the bullet, if it fits into the grooves, a rotation rapid in proportion to the force of the explosion and the sharpness of the twist in the spiral. This revolution of the bullet on its own axis keeps that axis, gravity excepted, in the line in which it leaves the piece. In 1628 Arnold Rotsiphen patented a new way ot "makeing gonnes," which, from a subsequent patent granted him in 1635 appears to have consisted, among other improvements, in rifling the barrels. It would be tedious to enumerate the various principles of rifling which were tried during the two centuries following Rotsiphen—suffice it to say that scarcely a form of rifling now prevails but had its prototype among the old inventions. The difficulty of mechanical appliances making the rifling true, deferred, however, their general introduction, and the cost of rifled arms limited their use to the purposes of the chase. The revolutionary government of France had rifles issued to portions of their troops, but they met with so indifferent a success that Napoleon recalled them soon after he came to power. In the peninsula, however, picked companies of sharpshooters practiced with rifles with deadly effect on both the English and French sides. During the American war, 1812–14, the Americans demonstrated incontestably the value of rifles in warfare; but many years were yet to elapse before they were definitively placed in the hands of soldiers, many of those of every nation in the Crimea having fought with the ineffective and almost ridiculous "Brown Bess." Soon after the French invaded Algeria, they had armed the chasseurs d'Orleans with rifles, to counteract the superior range of the Arab guns. The inutility of the old musket was shown in a battle during the Kaffir war, where our men discharged 80,000 cartridges, and the loss of the enemy was 25 men struck. After experiments with the old musket, it was found that its aim had no certainty whatever beyond 100 yards. It was soon discovered that a spherical ball was not the best missile; one in which the longer axis coincided with the axis of the gun flying truer—the relative length of the axis and the shape of the head being matters of dispute. The first war-rifle was that of capt. Delvigne, proposed in 1826, and adopted for a few men in the French army; but this still included the old and rude plan of forcing the leaden ball through the grooves by blows of the ramrod, it being of course requisite that the projectile should occupy the grooves tightly. In 1842 col. Thouvenin invented a *carabine à tige*, in which the breech had a small pillar screwed into it, round which the powder lay, and on the end of which the bullet rested, its base being flattened out by the force of the ramrod. Col. Delvigne added a conical bullet to this rifle, and the combined invention was issued to the chasseurs d'Afrique in 1846. But the *tige*, or pillar, became bent by usage, and was found otherwise objectionable. It was superseded by using with a grooved barrel the minie bullet, which, being made smaller than the bore of the piece, could be almost dropped into the barrel. It was of lead, and in its base it contained a conical recess, to receive the apex of a smaller iron cup. The force of the explosion drove this cup into the bullet, causing the lead to expand into the grooves of the barrel. (It is right, however, to state that this contrivance is claimed for a Mr. Greener as early as 1836.) The Prussians, meanwhile, had armed their troops with the needle-rifle (*Zündnadelgewehr*), now superseded by the *Dreyse*. In England, however, no improvement took place until 1851, when 28,000 rifled muskets to fire the minie bullet were ordered to be issued. Notwithstanding the many advantages of the minie system, it was found defective in practice. Experiments were set on foot in all directions, and resulted in 1853 in the production of the Enfield rifle, which had three grooves, taking one complete turn in 78 in., and fired a bullet resembling the minie, except that a wooden cup was substituted for one of iron. From 1853 to 1865 this was the weapon of the British army. In 1865 the adoption of breech-loading arms (q.v.), caused the Enfield to be converted into a breech-loader by fitting the "Snider" breech mechanism to the Enfield barrel.

This arrangement was, however, only temporary, and after a most exhaustive series of trials before a special committee on breech-loading rifles, the Henry barrel was in 1871 adopted in conjunction with the Martini breech for the new small-bore rifle for the British army, now known as the Martini-Henry rifle. No fewer than 104 different kinds of breech-loading small-arms were submitted to this committee, who decided that the Henry 45-in. bore barrel "was the best adapted for the requirements of the service," on account of its "superiority in point of accuracy, trajectory, allowance for wind, and and penetration," and also on account of its great durability. The Henry system of rifling is the invention of Mr. Alexander Henry, gunmaker, Edinburgh, and its essential peculiarity consists in the form of the rifle bore.

The rifling represents a septilateral figure with angular projections extending inwards from the angles of the planes. In other words, the rifling forms 7 plane surfaces, and the periphery of the projectile touches the planes at the center. In addition to the bearing sufaces thus obtained, there are 7 angular projections which extend inward from the planes, so that the apex of each of the projections is concentric with the center of the surfaces of its contiguous planes. These seven ridges thus afford a further bearing or support to the projectile, and by this means double the points of bearing are obtained. These angular ridges fill up to a great extent the spaces between the angles of the planes and the periphery of the projectile, thus reducing the windage, and from their peculiar construction facilitating the expansion of the bullet to the major diameter of the bore, so that the rotatory or spiral motion of the projectile is obtained with greater certainty; at the same time, the figure of the projectile is so little altered that it traverses through the air with less resistance, and consequently its flight is rendered more accurate.

The length of the Henry barrel is 32½ inches. The mean diameter of the bore is .450 of an inch, and the rifling takes one complete turn in 22 inches. Its bullet is solid, with a slight cavity in the rear, and weighs 480 grains, the charge of powder being 85 grains. The range, accuracy, and penetration of the "Henry" barrel is nearly twice that of the present Enfield-Snider barrel, while the highest point of its trajectory at 500 yards is 2 ft. 9 in. lower, or 8 ft. 1¾ in. as compared with 11 ft. 10¾ in. The maximum range of the Henry barrel is 3.685 yards at an angle of 28° 15'.

As with small-arms, so with cannon, rifling is no new discovery. In the museum at St. Petersburg is a cannon which was rifled in nine grooves as early as 1615. In 1661 the Prussians experimented with a gun rifled in 13 shallow grooves. By 1696 the Germans had tried elliptical bores. From thence till 1833, many attempts were made to rifle cannon, with more or less success. In 1833 and 1836, M. Montigny of Brussels tried rifled guns with considerable success. In 1845 col. Cavalli of the Sardinian service commenced experiments with his rifled cannon: two Swedish officers—baron Wahrendorf and lieut. Engstroem—next produced rifled cannon; but none of these systems were permanently adopted. The Crimean war set inventors vigorously at work, and many admirable guns have resulted from their attempts, the great difficulty of the day being to decide which is most effectual. The first point was the metal; and here cast-iron was found quite useless, being incapable of resisting the explosion of the large charges necessary to force closely fitting projectiles through rifled barrels. Several plans were resorted to. Sir William Armstrong welds coils of wrought iron round a mandrel into one homogeneous mass of extraordinary tenacity, which he again strengthens by similar rings round the breech. Mr. Whitworth forces rings of wrought-iron over the barrel by hydraulic pressure; capt. Blakely strengthens a barrel of longitudinal bars welded together by shrinking wrought-iron bands over it. The French rifle brass guns, and use small charges; having also guns of wrought-iron. The Austrians have made a new bronze alloy, which has proved extremely strong; the Belgians have tried Bessemer's steel. The system of rifling was the next important matter. Mr. Lancaster adhered to his oval bore; sir William Armstrong produced a bore rifled in a great number of small sharp grooves (this gun was adopted by the British government); Mr. Whitworth retained a hexagonal bore; and the French government adopted a bore with two, and subsequently three rather deep spiral grooves. After careful experiments, the Austrian, Spanish, Dutch, and Italian governments have concurred in the French system. In the Armstrong the rotation is communicated to the projectile by the latter being cased with lead, which the explosion forces into the grooves. The numerous fine grooves impart a very correct centering to the shot, and give extreme accuracy of range; but they render the gun a delicate weapon, and they preclude the occasional firing of round shot or canister, which would destroy the grooves. In the Whitworth the shot is constructed to pass freely through the spiral hexagonal bore, windage being prevented by a greased wad, which is said to foul the piece considerably. Lancaster's shot are elliptical, to correspond with the bore; they are simple and accurate; but there is some danger that they will jam in the gun, and cause it to burst. The French projectiles have ribs of projecting metal to correspond to the grooves, and are very effective, the system having the concomitant advantage of being able to fire ordinary shot without material injury to the gun. To sum up: the Armstrong gun is the most accurate, that and the Whitworth have the longest range, each having attained 5½ m.; the Lancaster fouls least; the French is simplest, and can fire ordinary cannonballs, canister, or case.

The Armstrong gun was officially adopted into the British service in 1859, as the best weapon then known, but it has been superseded by an improved version known as the Woolwich gun.

The projectiles used with the various guns will be described under SHELL and SHOT.

RIFLEMEN are troops armed with rifles, and employed more or less as sharpshooters. The name has nearly lost all meaning, for the whole infantry are now riflemen; but a few years ago—i.e., as late as 1854, the riflemen were quite the exception, the army generally having the smooth-bore "Brown Bess." There were at that time only two line regiments of rifles, the 60th and the rifle brigade, with 2 colonial regiments of infantry (Canadian rifles and Ceylon rifles), and one Hottentot regiment of mounted infantry (the Cape mounted rifles). The establishment of rifle regiments was taught to the British by the Americans and French, from the sharpshooters of both of which nations our armies suffered severely. During the French war, the 60th and 95th regiments were armed as riflemen, taught light infantry drill, and clothed in dark green, to be as invisible as possible. The 95th became the rifle brigade. Experiment has since shown that gray is less conspicuous than green as a uniform, whence its adoption by many volunteer corps.

The volunteer riflemen of Great Britain will be described under VOLUNTEERS.

RIGA, a most important seaport of Russia, capital of Livonia, and the center of administration for the three Baltic provinces, Livonia, Esthonia, and Courland, stands mainly on the right bank of the Dwina, 5 m. from the mouth of that river, in the gulf of Riga. It is 376 m. s.w. of St. Petersburg, and is the terminus of a railway to Moscow, which again connects it with the Volga, and thus with the Caspian sea, bringing to Riga a considerable portion of the trade with the interior, and still more remote parts of Russia. A junction with the St. Petersburg and Berlin railway places this Baltic port in direct communication with the rest of Europe. From the steeple of St. Peter's church, said to be the highest in the empire, a full view of the situation of the city is obtained. Riga contains a number of striking and handsome public buildings, of which the castle, or dom, built in 1204, now the residence of the governor-general of the three Baltic provinces, is the chief. The Dwina is crossed by a bridge of boats, 800 paces long, of which the boats in the middle are movable, to allow of the passage of vessels, and which is entirely removed in winter. The old town is dark and gloomy, and shows all the main features of a German town of the middle ages; but the extensive suburbs are modern and handsome, and the whole is defended by ramparts, bastions, and other fortified works. Riga is the second trading town in Russia. It contains numerous soap, candle, glass, and iron works; cloth, leather, sugar, and tobacco factories, and rope-walks. Shipbuilding is extensively carried on in the town and vicinity. The principal articles of export are flax, hemp, linseed, corn, timber, tallow, and tobacco. In 1871 the exports amounted in value to £6,473,154; the imports, to £2,867,218. The total number of vessels which entered the port was 2,396, of tonnage 559,727, and the same number cleared it; of these, 580, measuring 227,425 tons, were British. Pop. '67, 102,043.

Riga was founded in the beginning of the 13th c. by Albert Buckshoevden, bishop of Livonia, and soon became a first-rate commercial town, and member of the Hanseatic league. The Teutonic knights possessed it in the 16th century. In 1621 Riga was taken by Gustavus Adolphus, and held under Swedish dominion till 1710, but was finally annexed to Russia in 1721.

RIGA, GULF OF, an inlet in the n.e. of the Baltic sea, washes the shores of the three Baltic provinces, Courland, Livonia, and Esthonia. It is over 100 m. in length from n. to s., and is about 70 m. in breadth. The islands of Oesel, Dagö, Mohn, and Worms stand in the entrance to it, and narrow the mouth of the gulf to a passage about 20 m. in width. The chief river which falls into the gulf is the Dwina. Sand-banks render navigation in some parts dangerous.

RIGDON, SIDNEY, 1793–1876; b. Penn.; received for publication while a printer at Pittsburg in 1812, a manuscript of a strange fiction in antique style, from Solomon Spaulding, a preacher noted for mental peculiarities, entitled *The Manuscript found*, or *The Book of Mormon*. He made a copy before returning it to Spaulding, who soon after died. In 1817 Rigdon left the printing office, became a preacher of peculiar doctrines similar to those which afterward appeared in the book of Mormon. In 1829 he became associated with Joseph Smith, and they arranged to publish the book of Mormon. When it appeared it was claimed by the widow as Spaulding's last work. Rigdon accompanied Smith to Kirtland, Ohio, to Missouri, and Nauvoo, where he was made one of the three presidents of the new church. After the death of Smith he aspired to succeed him as the head of the church, but Brigham Young was chosen. Rigdon refusing to acknowledge his authority was excommunicated for contumacy, returned to Pittsburg, where he died in obscurity.

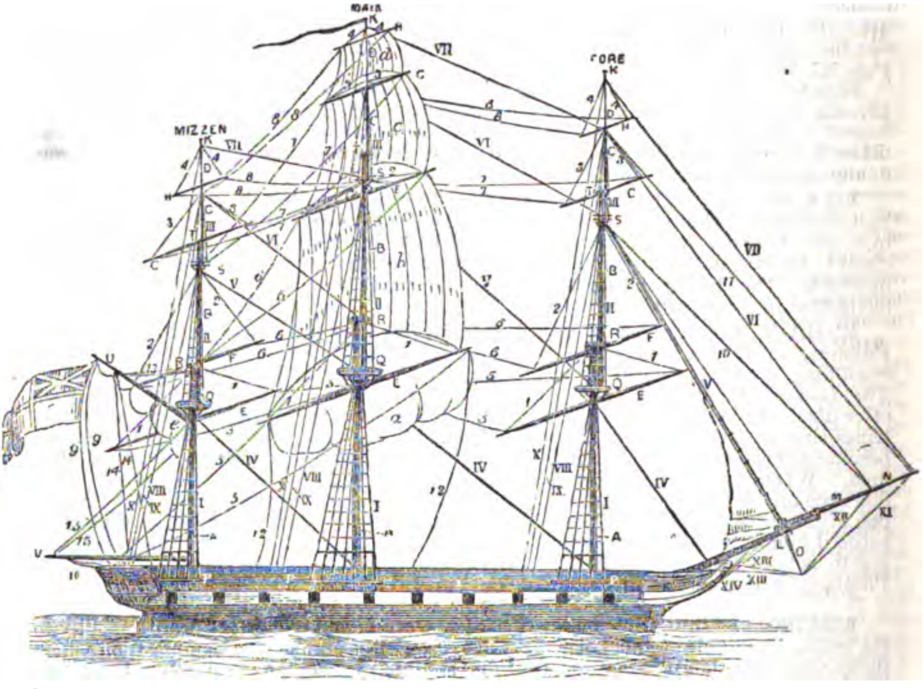
RIGGING, in a ship, is a combination of very numerous ropes to afford stability to the masts, and to lower and hoist the sails. Notwithstanding the complication which the cordage of a rigged ship presents at first sight to the eye, the arrangement is remarkably simple. In all substantial points, the rig of each mast is the same; to understand one is, consequently, to understand all. In the accompanying diagram, spars are shown by capital letters; sails, by italic letters; *standing* rigging, by Roman numerals; and *running* rigging, by Arabic numerals. To avoid a confusing number of symbols and needless repetition, the corresponding ropes, etc., on each mast bear the same numbers, and in the key, the name of such rope *per se* is only given. To find the full title of a rope, it is necessary to prefix (unless it pertain to the bowsprit or gaff) the name of the mast (mizzen, main, or fore) to which it belongs. For example, the spars marked D are, counting from the left, i.e., the stern, called respectively mizzen-royal-mast, main-royal-mast, and fore-royal-mast; the standing-ropes marked IV, are the mizzen-stay, main stay, and fore-stay; and the running-ropes bearing the figure 5, are mizzen-braces, main-braces, and fore-braces.

Rigging is either *standing* or *running*. The former is employed in maintaining, in fixed position, the masts and bowsprit; the latter runs freely through numerous blocks, and its functions are to raise and lower the upper masts and the yards, to trim the sails, to hoist the signals and other flags, and occasionally to furl the sails.

Each mast has the following standing rigging: at each side *shrouds* (I., II., III.), consisting of several very thick (usually plaited) ropes; in front, the *stay* (IV., V., VI., VII.); and behind, the *backstays* (VIII., IX., X.), coming down to the ship's sides behind the shrouds. Across the lowermast and topmast shrouds, thin ropes, called ratlings, are hitched horizontally, and form convenient ladders for the men to use in going aloft. The standing rigging of the lowermast reaches the chains on the ship's sides; while the shrouds of the topmast and topgallantmast are worked into the top, their stays to the tops of the mast nearer the bow in each case (the bowsprit serving as an anterior mast for the fore-rigging); all the backstays, however, are brought down to the ship's sides. In steamers, the mainstays require modification, in order to avoid the funnel; they are often adjusted on a plan similar to that of the backstays. The standing rigging of the bowsprit consists of the bobstays (XIV.), generally of chain; the martingale stays (XI., XII.), and martingale backstays (XIII.), which all exert an adverse pressure to that of the stays from the foremast, topmast, etc.

The *running* rigging is of four classes: 1. Lifts for the upper masts and the jib-boom. These are not shown in the diagram, from the fact that they run parallel, and closely contiguous to the masts, topmasts, and bowsprit.

2. The lifts for the yards and sails. Each yard has two lifts, one proceeding from a point near either extremity, and passing through a pulley at the head of that section of the mast to which the sail or yard belongs. They are worked either on the deck or in the top. The yard-lifts are shown by the numbers 1, 2, 3, 4. The gaff and boom have separate lifts working into the mizzen-top (13, 15). Each jib-sail has a lift (not shown),



Spars, etc.—A, mast; B, topmast; C, topgallantmast; D, royal-mast; E, yard; F, topsail-yard; G, topgallantsail-yard; H, royal-yard; K, truck; L, bowsprit; M, jib-boom; N, flying jib-boom; O, martingale; P, chains; Q, top; R, cap; S, crosstrees; T, topmast cap; U, gaff; V, boom, or spanker-boom.
Sails.—*a*, mainsail; *b*, topsail; *c*, topgallantsail; *d*, royal; *e*, spanker.
Standing Rigging.—I, shrouds; II, topmast shrouds, crossed by ratlings; III, topgallant shrouds; IV, stay; V, topmast stay; VI, topgallantmast stay; VII, royal stay; VIII, topmast backstay; IX, topgallantmast backstay; X, royal backstay; XI flying jib-boom martingale stays; XII, jib-boom martingale stays; XIII, martingale backstays; XIV, bobstays.
Running Rigging.—1, lifts; 2, topsail lifts; 3, topgallantsail lifts; 4, royal lifts; 5, braces; 6, topsail braces; 7, topgallant braces; 8, royal braces; 9, signal halyards; 10, jib-stay; 11, flying jib-stay; 12, sheet; 13, peak halyards; 14, vangs; 15, topping lifts; 16, spanker sheet.

which acts parallel and close to IV., V., 10, or 11. If the ship carry stay-sails, there will be lifts parallel to the main and mizzen topmast stays and higher stays.

3. The ropes for adjusting the sails when spread. These comprise, first, the sheets for hauling down the lower corners of each sail—specimens are shown at 12; secondly, the braces for turning the yards about, to trim the sails to the wind. Each yard has two braces, one from either end passing to an adjoining mast, except the main braces, which are brought to the ship's side near the stern. The braces are shown as Nos. 5, 6, 7, 8. The vangs and spanker sheet (14, 16) perform similar offices for the spanker. There are

minor ropes in connection with the sails, for assisting in furling, reefing, spreading, etc.; but it would have rendered the diagram too complicated to have inserted them

4. Ropes in connection with the flags. Each mast has at its head a *truck*, containing two or more small pulleys. Over each of these a thin halyard is passed, and brought down double to the deck. On these any required flag is rapidly bent and hoisted with great ease. There are two pair of similar halyards to the gaff-peak; and when the ship is to be decorated on any festive occasion, similar halyards are affixed to the end of each yard-arm.

In different classes of ships, slight modifications occur in the rigging, to suit particular circumstances, but the main principles of rigging are as detailed above for all sizes of decked vessels. See SAILS.

RIGGS, ELIAS, D.D., LL.D.; b. N. J., 1810; graduated at Amherst college in 1829, and Andover theological seminary in 1832; went the same year as a missionary of the American board to the east. He spent several years in Athens, Argos, and Smyrna; and has been since 1853 in Constantinople, except one year which he spent in New York, superintending the electrotyping of his Armenian translation of the Bible, when he also gave instruction in the Union theological seminary. He has translated the Bible into the Bulgarian tongue, and in 1878 completed the translation into the Turkish. Dr. Riggs is a proficient in many languages, the most of his work having been in modern Greek, Armenian, Bulgarian, and Turkish, of which he has published several manuals and grammars.

RIGGS, STEPHEN R., D.D., for many years a missionary to the Dakota Indians. He published a *Grammar and Dictionary of the Dakota Language*, which is regarded as a valuable contribution to American philology. He prepared also school-books for the Indians. With the aid of Dr. Williamson he translated most of the Bible into the Dakota language.

RI'GHI, a mountain of Switzerland, in the canton of Schwyz, between lakes Lucerne, Zug, and Lowerz, is isolated, and commands extensive views of some of the finest Swiss scenery. It is easily accessible; six mule-paths and the Righi railway, opened in 1871, lead to the summit, which, though it forms an admirable natural observatory in favorable weather, is only 5,905 ft. above the sea. Verdant pastures clothe the entire summit, and the slopes are belted with forests. Crowds of tourists, of both sexes, ascend the Righi every season, in order to enjoy the fine views, which, in clear weather, it commands. There is a large hotel at the top where tourists pass the night in order to see the sun rise. The native spelling is *Rigi*.

RIGHT, in legal language, is that kind of interest or connection with a subject-matter which serves as a foundation for an action or suit, or other protection of a court of law or equity; and hence it means an interest that can be enforced, for if it is such as a court of law or equity cannot take notice of, it may be called a natural or moral, but it is not a legal right. Strictly speaking, right merely means a relation between external nature and some person or other, and therefore there is no such thing as abstract rights, for a right is only intelligible when predicated of some person who can exercise or enforce it. There is an old practical division of all rights into rights of the person and rights of things. In the former class are included such divisions as rights of personal security and liberty; rights connected with marriage, infancy, etc.; while in the latter class are included the general rights arising out of the possession of real and personal property. There are various subjects which do not fall under either division exclusively: indeed, none of the usual divisions of rights can be said to be more than vaguely descriptive of their subjects. It might naturally be expected that the correlative legal expression for rights should be wrongs, but this is not the case, the word wrong being used technically to mean only that class of infringements of one's rights which are connected with the person or the personal use of property. Thus, the refusing or withholding payment of a debt is not correctly called a legal wrong; but an assault or injury to one's person, or to one's property, irrespective of any contract, is properly called a wrong or a tort. The word right is also used, more or less technically, in a narrower sense. An action called a writ of right had for its object to establish the title to real property; but it was abolished, the same object being secured by the order of ejectment. A *petition of right* is a proceeding resembling an action by which a subject vindicates his rights against the crown, and recovers debts and claims, the first step being a petition, which is allowed by the home secretary, and referred for trial to a court of law. A *right of way* is a right of a private owner or occupier to a way over the land of an adjoining proprietor, as incidental to his possession of a house, or premises, or land. *Right of action* means simply a right to commence an action in one of the courts of law to recover damages or property. *Right of common* means a right of one who is not the owner or occupier of waste land, to send cattle to graze upon it, or to cut turf, or exercise some partial right of property over it. *Right of entry* is a right to possess and use land or premises, etc.

RIGHTS, DECLARATION AND **BILL** OF. The convention which called the prince and princess of Orange to the throne of England set forth, in a solemn instrument known by the name of the *Declaration of Rights*, those fundamental principles of the constitution which were to be imposed on William and Mary on their acceptance of the crown. This declaration, drawn up by a committee of the commons, of which Mr. (afterward lord) Somers was chairman, and assented to by the lords, began by declaring that king James II. had committed certain acts contrary to the laws of the realm. The king, by whose authority these unlawful acts had been done, had abdicated the throne; and the prince of Orange having invited the estates of the realm to meet and deliberate on the security of religion, law, and freedom, the lords and commons had resolved to declare and assert the ancient rights and liberties of England. It was therefore declared that the power of suspending and of dispensing with laws by regal authority is illegal; that the commission for creating the late court of commissioners for ecclesiastical causes, and all commissions and courts of the like nature, are illegal; that the levying of money for the use of the crown by prerogative, without grant of parliament, is illegal; that it is the right of the subjects to petition the king, and all prosecutions for such petitioning are illegal; that the raising or keeping of a standing army in time of peace, except with consent of parliament, is illegal; that Protestant subjects may have arms for their defense; that the election of members of parliament should be free; that freedom of speech in parliament should not be questioned in any place out of parliament; that excessive bail ought not to be required, or excessive fines imposed, or cruel or unusual punishments inflicted; that jurors should be duly impaneled, and that jurors in trials for high treason should be freeholders; that grants and promises of fines and forfeitures before conviction are illegal; and that for redress of all grievances, and the amendment, strengthening, and preserving of the laws, parliaments ought to be held frequently. All these things the lords and commons claimed as their undoubted rights and liberties; and having done so, they resolved that William and Mary should be king and queen of England for their joint and separate lives, the administration being during their joint lives in William alone; and that on their decease the crown should descend to the issue of the queen, then to that of Anne and her posterity, and, failing them, to the issue of William.

This declaration of rights was presented to the prince and princess of Orange at Whitehall, and accepted by them along with the crown. Being originally a revolutionary instrument, drawn up in an irregular assembly, it was considered necessary that it should be turned into law. The declaration of rights was therefore brought forward in the parliament, into which the convention had been turned, as a bill of rights, and passed the commons; but an amendment proposed in the lords regarding the settlement of the crown on the issue of the princess Sophia, in the event of Mary, Anne, and William all dying without issue, led to several ineffectual conferences between the two houses, which ended in the measure being dropped. The bill was, however, reintroduced in the following session of parliament (1689) without the proposed amendment, when it passed both houses, and obtained the royal assent—a clause, however, being added, which originated in the house of lords, to the effect that the kings and queens of England should be obliged, on coming to the throne, in full parliament or at the coronation, to repeat and subscribe the declaration against transubstantiation, and that a king or queen who should marry a papist would be incapable of reigning in England, and his subjects would be absolved from their allegiance.

RIGHTS OF MAN, a famous statement of rights, principally drawn up by Dumont, author of the *Souvenirs de Mirabeau*, and solemnly adopted by the French national assembly on Aug. 18, 1789. It declares that all mankind are originally equal; that the ends of the social union are liberty, property, security, and resistance to oppression; that sovereignty resides in the nation, and that all power emanates from it; that freedom consists in doing everything which does not injure another; that law is the expression of the general will; that public burdens should be borne by all the members of the state in proportion to their fortunes; that the elective franchise should be extended to all; and that the exercise of natural rights has no other limit than their interference with the rights of others. Mirabeau endeavored in vain to induce the assembly to postpone publishing any declaration of rights until after the formation of the constitution; but the deputies, feeling that a contrary course might imperil their popularity, issued the declaration—a proceeding which Dumont himself afterward compared to placing a powder-magazine under a building, which the first spark of fire would blow into the air. Louis XVI., under the pressure of the events of Oct. 5, after first refusing, was induced to yield his adhesion to it. The dogma of the equality of mankind on which the declaration rests had before been set forth in the American declaration of independence of 1776. Thinkers are now much less inclined than they were in the age of Rousseau to build social theories on such abstract, *a priori* assumptions; and the truth of this doctrine of original equality is directly impugned. Dumont himself asks: "Are all men equal? Where is the equality? Is it in virtue, talents, fortune, industry, situation? Are they free by nature? So far from it, they are born in a state of complete dependence on others, from which they are long of being emancipated."

The principles laid down in the *Rights of Man* were attacked by Edmund Burke in his *Reflections on the French Revolution*, who represented the declaration as a digest of anarchy. It was in reply to Burke's *Reflections* that Thomas Paine published in London his *Rights of Man*, an apology for, and commentary on, the principles of the French constitution, for which he was prosecuted for libel on an information by the attorney-general, and found guilty.

RIGHT, THE, in French politics. See POLITICAL PARTIES, FRENCH.

RIGID DYNAMICS is that portion of theoretical dynamics (q.v.) which, based on the theory of the free and constrained motion of *points*, applies the principles thence deduced to a *system* of points rigidly connected, so as to bear throughout the whole continuance of their motion the same invariable position with relation to each other; in other words, as no body in nature can be considered as a point, but is truly a system of points, rigid dynamics has for its aim to apply the abstract theory of dynamics to the cases actually occurring in nature. For a long time problems of this sort were not resolved by any general and adequate method, but each class was worked out according to a method specially applicable to its particular circumstances. The great general principle discovered by the French geometer, commonly known as *D'Alembert's principle*, which applies equally to all such problems, and removes the necessity for specially investigating each particular case, was an inestimable boon to mechanical science. It is thus stated in his *Traité de Dynamique:* "In whatever manner a number of bodies change their motions, if we suppose that the motion which each body would have in the following moment, if it were perfectly free, is decomposed into two others, one of which is the motion which it *really* takes in consequence of their mutual actions, then the other component will be such, that if each body were impressed by a force which would produce it alone, the whole system would be in equilibrium. In this way every dynamical problem can be compelled to furnish an equation of equilibrium, and so be changed into a problem of *statics* (q.v.); and thus the solution of a difficult and complex problem is effected by means of the resolution of a much easier one. D'Alembert applied his principle to various problems on the motions and actions of fluids, the precession of the equinoxes, etc.; and subsequently, in a modified form, the same general property was made the basis of a complete system of dynamics, by La Grange, in his *Mécanique Analytique.*

RIG'OR MOR'TIS is the term usually given to the peculiar temporary rigidity of the muscles that occurs shortly after death. It begins immediately after all indications of irritability (see MUSCLE) have ceased, but before the commencement of putrefaction. In the human subject it most commonly begins to show itself about seven hours after death, although cases are occasionally met with in which 20 or even 30 hours may have elapsed before it begins to appear. This condition of rigidity usually lasts for about 30 hours; but it may pass off in 10 hours or less, or may be prolonged to four or six days. The muscles of the neck and lower jaw are first affected, then those of the trunk, then those of the upper extremities, and lastly those of the lower extremities. In its departure, which is immediately followed by decomposition, the same order is followed.

This subject has been admirably discussed by Dr. Brown-Sequard in the "Croonian Lecture" for 1861, and contained in *The Proceedings of the Royal Society* for that year. In this lecture he examines successively the relations existing between muscular irritability, *post-mortem* rigidity, and putrefaction, in a variety of cases. The following are his chief conclusions: 1. Paralyzed muscles are endowed with more irritability than healthy muscles; cadaveric rigidity sets in late, and lasts long; and putrefaction appears late, and progresses slowly. 2. Experiments made on numerous animals show that when muscular irritability is increased by a diminution of temperature, the increase has the same effect upon rigidity and putrefaction as when it is caused by paralysis. As a general rule, when there was a difference of 14° to 18° Fahr. in the temperature of two animals of the same age and species, irritability and rigidity lasted twice or three times longer in the cooler animal than in the other, and putrefaction in the former was much less rapid. 3. It was maintained by John Hunter that cadaveric rigidity does not take place after death by lightning; but it is now known that this view is not generally true. When lightning destroys life by producing such a violent convulsion of every muscle in the body that muscular irritability at once ceases, the ensuing rigidity may be of such short duration as to escape notice; but if it causes death by fright, hemorrhage, or concussion of the brain, cadaveric rigidity will appear as usual. 4. In animals that have been over-driven, hunted to death, etc., rigidity comes on very quickly, lasts for a very short time, and is rapidly succeeded by putrefaction; and various facts quoted by Brown-Sequard show that over-exertion acts similarly in man. 5. The nutrition of the muscles exerts a modifying influence on rigidity and putrefaction. In cases of death from decapitation, strangulation, sudden hemorrhage from a wounded artery, etc., cadaveric rigidity does not begin till 16 or 18 hours after death, and lasts from six to eight days; while in a case of death from exhaustion, after a prolonged typhoid fever, rigidity became evident within three minutes after the last breathing, while the heart was still beating; disappeared in a quarter of an hour, and was at once succeeded by signs of putrefaction before the man had been dead an hour. 6. When death follows violent and prolonged convulsions (as in cases of tetanus, hydrophobia, etc.), cadaveric rigidity sets in soon (usually within an hour after death), and ceases before the end of the tenth hour; and when the convulsions were caused by strychnine, similar results were obtained.

From these facts this accomplished physiologist deduces the general law that "the greater the degree of muscular irritability at the time of death, the later the cadaveric rigidity sets in; and the longer it lasts, the later also putrefaction appears, and the slower it progresses."

The exact cause of this rigidity is not accurately known. The old view that it depended on the coagulation of the blood is no longer tenable. It most probably results from the spontaneous coagulation of a fibrinous material contained in the muscular juice.

RIG-VEDA, the first and principal of the four Vedas. See VEDA.

RILEY, a co. in n.e. central Kansas, drained by the Kansas, Republican, and Big Blue rivers; traversed by the Kansas Pacific railroad; about 575 sq.m.; pop. '80, 10,430—8,319 of American birth. The surface is rolling prairie or woodland. The soil is fertile. The principal productions are corn, wheat, oats, and live stock. Co. seat, Manhattan.

RILEY, BENNET, 1786–1852; b. Baltimore; entered the army and took part in several engagements with the Indians. He served through the Mexican war, and was appointed brevet maj.gen. for his conduct at Contreras. He was commander of the department of Upper California, 1849–50.

RILEY, CHARLES VALENTINE, b. London, 1843; came to this country at the age of 17, engaged in farming at the west for 3 years, was entomological editor of the *Prairie Farmer*, in Chicago, 1863–68. In the latter year he was appointed state entomologist of Missouri; and associated with B. D. Walsh, state entomologist of Illinois, began the publication of *The American Entomologist*, a monthly magazine. He has made valuable discoveries in relation to the anatomy and habits of potato beetles, cicadas, locusts, yuccas, and army worms, which, with practical suggestions on grape culture, received with favor in this country and in France, have appeared in his annual reports.

RIMA-SZOMBATH, a market t. of Hungary, on the river Rima, 23 m. n.e. of Pesth. Articles in wood are largely manufactured, and there is a trade in linen and bullocks' hides. Pop. '69, 4,664.

RI'MINI (ancient *Ariminum*), a city of central Italy, province of Forli, in Romagna. It is situated on the river Marecchia, and though the ancient harbor has been gradually filled up by the sands brought down by that stream, the port is still the resort of a large number of vessels engaged in fisheries, which employ nearly half the population of the town, Pop. '71, 10,000. Rimini has fine streets, well-built houses, a handsome town-hall with porticoes, many fine churches, among others the cathedral built by Leon Battista Alberti, the interior of which is full of monuments; outside it is adorned with sarcophagi. It has a library, many superior schools, and two orphan asylums. Among its ancient monumental edifices still remaining, may be numbered the marble bridge of Augustus over the Marecchia, and the marble arch of Augustus. Its manufactures are glass and sail-cloth. Rimini was founded by the Umbri; it was conquered by the Romans, sacked by Sulla, frequently destroyed by the barbarians, then given by Charlemagne to the church.

RIMOUSKI, a co. in n.e. Quebec, having the province of New Brunswick on the s., and the river St. Lawrence for its w. and n.w. boundary; 4,931 sq.m.; pop. '71, 27,418. It is intersected by the Grand Trunk railway. Its surface is covered with a dense growth of timber. It is drained by the Metapediac, a lake of the same name, the river Mitis and Mitis lake, the river Rimouski, and Tartigo river, emptying into the Restigouche and the St. Lawrence. Co. seat, Rimouski.

RINDERPEST. See CATTLE-PLAGUE.

RINE'HART, WILLIAM HENRY, 1825–75; b. Md.; received a common school education, and became a journeyman marble-worker. His taste for sculpture was marked; by hard work and without instruction he acquired some skill in modeling, and in 1855 visited Florence, Italy, where he studied art for two years. On his return to Baltimore, 1857, he exhibited two *bas-reliefs*, "Night" and "Morning," which attracted much attention. In 1858 he returned to Italy, and the rest of his life was spent in Rome, where he soon took his place as one of the foremost American sculptors. He completed the modeling of the bronze doors of the capitol, made many portrait busts, and a bronze statue of chief-justice Taney for the state of Maryland. Among other works were his "Angel of the Resurrection," "Jesus," "Woman of Samaria," and "Sleeping Children." Of the last several *replicas* were ordered. His best work is "Clytie just forsaken by Apollo." This is now the property of the Peabody institute of Baltimore.

RINFORZAN DO (Ital., strengthening), in music, a direction to the performer indicating increased tone and emphasis.

RING (Sax. *ring* or *hring*, a circle or circular line), a circle of gold or other material. The practice of wearing rings has been widely prevalent in different countries, and as different periods. Rings have been used to decorate the legs, arms, feet, toes, neck, fingers, nose, and ears. The practice of wearing rings suspended from the nose, which is bored for that purpose, has been found among various savage tribes, more particularly the South-sea islanders. Bracelets, necklaces, and ear-rings have been worn among nations both savage and civilized; but the most universal and most famous use of rings is on the finger. Finger-rings are alluded to in the books of Genesis and Exodus; Herodotus mentions that the Babylonians wore them; and from Asia they were probably introduced into Greece. The rings worn in early times were not purely ornamental, but had their use as signet-rings. The Homeric poems make no mention of rings, except ear-rings; but in the later Greek legends, the ancient heroes are described as wearing finger-rings; and every freeman throughout Greece seems afterwards to have had one. The practice of counterfeiting signet-rings is alluded to as existing in Solon's time. The devices on the earlier rings were probably cut in the gold; but at a later period, the Greeks came to have rings set with precious stones, which by and by passed from articles of use into the category of ornament. Persons were no longer satisfied with one ring, but wore two or three—and their use was extended to women. The Lacedæmonians wore iron rings. The Romans are said to have derived the use of rings from the Sabines; their rings were at first, as those of the Greeks, signet-rings, but made of iron. Every free Roman had a right to wear one; and down to the close of the republic, the iron ring was worn by those who affected the simplicity of old times. Ambassadors, in the early age of the republic, wore gold rings as a part of their official dress—a custom afterward extended to senators, chief magistrates, and in later times to the equites, who were said to enjoy the *jus annuli aurei*, from which other persons were excluded. It became customary for the emperors to confer the *jus annuli aurei* on whom they pleased, and the privilege grew gradually more and more extensive, till Justinian embraced within it all citizens of the empire, whether *ingenui* or *libertini*. The signs engraved on rings were very various, including portraits of friends or ancestors, and subjects connected with mythology or religion: and in the art of engraving figures on gems, the ancients far surpassed artists of modern times. The later Romans, like the Greeks, crowded their fingers with rings, and the more effeminate among them sometimes had a different ring for summer and winter. Rings entered into the groundwork of many oriental superstitions, as the legend of Solomon's ring, which, among its other marvels, sealed up the refractory Jins in jars and cast them into the Red sea. The Greeks mention various rings endowed with magic power, as that of Gyges, which rendered him invisible when its stone was turned inward; and the ring of Polycrates, which was flung into the sea to propitiate Nemesis, and found by its owner inside a fish; and there were persons who made a lucrative traffic of selling charmed rings, worn for the most part by the lower classes.

Various explanations have been given of the connection of the ring with marriage. It would rather appear that wedding-rings were worn by the Jews prior to Christian times. It has been said that as the delivery of the signet-ring to any one was a sign of confidence, so the delivery of a ring by the husband to the wife indicated that she was admitted into his confidence. Another explanation is, that the form of the ring symbolizes eternity and constancy; and it has been alleged that the left hand was chosen to denote the wife's subjection to her husband, and the third finger, because it thereby pressed a vein which was supposed to communicate directly with the heart. The third finger has always been selected as the finger on which official rings are to be worn. Bishops on their consecration receive a ring to be worn on the third finger of the right hand, in order to indicate ecclesiastical authority, and doctors were formerly in use, for a similar reason, to wear a ring on the same finger. A ring has been much used at betrothal as well as marriage, and in many parts of the continent of Europe a wedding-ring is worn by the husband as well as the wife. In Britain rings are occasionally worn on all the fingers except the first finger and thumb; the Germans usually wear a signet-ring on the first finger. During the 16th, 17th, and 18th centuries it was a very common practice to have mottoes inscribed on rings, including wedding-rings, and the motto was called the *posy* or *chanson*. The ring was the symbol of the dominion of Venice over the Adriatic: and yearly, on ascension day, a ring was thrown by the doge from the ship *Bucentaur* into the sea, to denote that as the wife is subject to her husband, so is the Adriatic sea to the republic of Venice.

In pagan times in Europe, the ring seems to have been connected with fidelity or with espousals. A form of betrothal ring called a *gimmal*, or linked ring, was used in later times. By an ancient Norse custom, described in the *Eyrbrygia Saga*, when an oath was imposed, he by whom it was pledged passed his hand through a silver ring, sacred to that ceremony; and in Iceland the ceremony of betrothal used to be accompanied by the bridegroom passing his four fingers and thumb through a large ring, and in this manner receiving the hand of the bride, as represented in a woodcut in an old edition of *Olaus Magnus*. As lately as 1780 the practice existed in Orkney of a man and woman plighting their faith at the standing stones of Stennis by joining their hands through the perforated stone of Odin.

Rings were greatly used in ancient Egypt. They were called *tebh*, finger-rings, and *khatem*, signets, both kinds being represented in the sculptures and mentioned in the hieroglyphs. Besides these two classes, solid rings of gold and silver were used as money. Rings for the fingers are of the most remote antiquity, and were the emblems of rank and power. They were of two kinds; the solid ring, made of gold, silver, copper, or iron, having a square or oval bezel, on which the subject to be impressed was sunk or cut in intaglio. The oldest of these were of gold, iron not having been in use till the Roman rule over Egypt, or about the 1st c. A.D. A remarkably fine specimen is one of a Hemphite priest or flamen of the monarch Cheops, who lived in the time of the 26th dynasty, about the 5th c. B.C. But rings of this class are probably not so old as the other kind, which have a square or oblong plinth of gold, stone, or glass, on which the subjects are engraved also in intaglio. These plinths are pierced through their long axis to admit the metal ring on which they revolve, and are secured to it by wire coiled round the ring at the place of insertion. Scarabæi of glazed steatite, set in frames of gold or silver, were often used for bezels. The bezels have their base engraved with hieroglyphs and other subjects, the names of monarchs, figures of deities, mottoes, and devices. Such rings were used by functionaries; and in the account of the investiture of Joseph in the book of Genesis, a ring was put on his finger as a symbol of his rank. The poorer classes had rings of ivory or blue porcelain, with solid oval bezels, having in intaglio similar subjects. Rings appear to have been placed on all the fingers, and even the thumb. and the hands of ladies were loaded with these costly ornaments. A cat, emblem of the goddess Bast or Pasht, the Egyptian Diana, was a favorite subject of ladies' rings. The third finger of the left hand was the ring finger. Some remarkable instances of gold rings with revolving bezels have been found, as that of Thothmes III. in the collection of lord Ashburnham, and another with the name of the monarch Horus, which contained gold to the value of £20. Such rings could give two impressions, like the seal and counter-seal of modern times.—Wilkinson, *Mann. and Cust.*, vol. iii. pp. 370 and foll.; Bonomi, *Trans. R. Soc. Lit.*, new series, vol. i. p. 108; Prisse, *Mon. Egypt.*, Pl. xlvii.; also *Antique Gems and Rings*, by King, 2 vols. 1872; *Finger Ring Lore*, by William Jones, F.S.A., 1876.

RING, MELCHIOR, a prominent Anabaptist leader in Hesse in the time of the reformation; first a school-teacher and chaplain at Hersfeld. Having become a disciple of Thomas Münzer, he went to Sweden in 1524 with Hoffmann and Knipperdolling, and by his fanatical sermons excited in Stockholm a riot against images. He returned to Germany to take part in the "peasant's war," and, after a bloody catastrophe, fled to Switzerland, which he was compelled to leave on account of a murder committed as an act of religion by one of his followers. He attacked Luther and the evangelical preachers. Finally he fled to East Friesland; went to Hesse and Saxony, where he was frequently imprisoned. He died in connection with the Münster revolt.

RING-BONES consist of a circle of bony matter round the horse's coronet, are most common in the fore-limbs of draught horses with short upright pasterns, and much worked upon the hard roads; but they also occasionally appear on the hind limbs of lighter-bred horses. They seldom cause lameness, except when rapidly and recently formed; but as they are apt to stiffen the neighboring joints, they constitute unsoundness. Rest should be enjoined, and cold bran poultices or swabs, kept cool and moist by any refrigerant mixture, applied continuously until heat and tenderness are removed, when the fetlock is to be fired or dressed with fly-blister, or the ointment of the red iodide of mercury.

RINGDOVE. See PIGEON.

RINGGOLD, a co. in s. Iowa, adjoining Missouri, drained by the Platte and some of the branches of the Grand river; about 560 sq.m.; pop. '80, 12,085—11,492 of American birth. The surface is rolling. The soil is fertile. The principal productions are wheat, corn, oats, and live stock. Co. seat, Mount Ayr.

RINGGOLD, CADWALADER, 1802–67; b. Md.; son of gen. Samuel; entered the navy as midshipman 1819; rose through successive grades to rear-admiral, 1867. As commander he went on an exploring expedition to the n. Pacific and China sea. At the commencement of the rebellion he was engaged in the s. blockade squadron, commanding the frigate *Sabine*, operating against Port Royal, etc. He retired 1864. He published a *Series of Charts with Sailing Directions*, 4th ed. Washington, 1852.

RING'KJÖBING-FJORD, a lagoon on the n. coast of Jutland, Denmark, about 30 m. long and 9 wide, separated from the North sea by a long sandy strip. The town of Ringkjöbing is on its n.e. shore.

RING MONEY. At an early stage of society, prior to the invention of coinage, but after the inconveniences of direct barter had been discovered, the precious metals, formed into rings, were used as a medium of exchange; these same rings being also serviceable in some cases as personal ornaments. The use of ring money among the Egyptians is proved by representations of gold and silver money in their paintings, an instance of which is to be seen in one of the grottoes in the hill of Shek Aba at Quorneh, which bears the cartouche of Amunoph II. inscribed on its walls. The gold or silver rings were formed of a wire or bar of metal bent into a circle, but not quite united at the extremities, so that it could be easily made into a chain, from which portions could be detached at pleasure. It seems probable that the individual loops were not adjusted to a particular weight, but that each bundle of loops amounted in the aggregate to a particular weight. A metallic currency of this kind seems to be alluded to in the incident in the book of Genesis, of the Hebrew patriarchs finding their money "in full weight" at the mouth of their sacks. Ring money, both of gold and silver, similar to what is represented in the Egyptian paintings, was brought by Mr. Bonomi from Nubia. Some of the silver rings had been worn as bracelets, and were ornamented with engraved work. This kind of currency has probably never gone out of use in some parts of Africa since the remote period when it was employed in paying the exactions of the Pharaohs. Ring money for African traders is regularly manufactured at Birmingham of copper, or an alloy of copper and iron, and known under the name of "Manillas."

The ring money of the east found its way at an early period to western Europe, including the British islands. In Sweden and Norway its use seems to have continued down to the 12th c., or even later. A Norse law made about the year 1220 alludes to an established ring money, of which each ring was of a definite weight. The mediæval ring money had so far advanced beyond the Egyptian as to have each ring adjusted to a special weight, for which it might pass without weighing. Cæsar mentions gold and iron rings as used in Gaul and Britain for money; and gold and silver, and occasionally brass, ring money has been dug up in many parts of Britain, consisting of bars of metal bent in a circular shape; the ends in what seem to be the older specimens are left plain; in those of later times they are flattened and ornamented. One example, found in one of the *Weems*, or subterranean dwellings of the island of Shapinshay in Orkney, is composed of three bars of gold twisted together like a cord. A remarkable silver chain of 33 rings, weighing above 93 ounces, was dug up in 1805 near Inverness, in the course of the excavations for the Caledonian canal, and is now in the museum of the Scottish antiquaries. Some of the larger specimens of gold ring money are very highly decorated. The gold torque worn round the neck of the Gallic warriors, weighing sometimes as much as four pounds, besides being a personal ornament, was adjusted to a certain weight as money.

Among the various modifications of ring money in use in different countries, may be mentioned the silver fish-hook money of Ceylon, mentioned by Tavernier, of the form of a flat wire bent into a hook, and issued as late as 1659. Specimens of it have lately been dug up.

RING-OUZEL, *Turdus torquatus*, or *Merula torquata*, a species of thrush, rather larger than the blackbird, which it much resembles. It is a native of Europe, and chiefly of the western parts of it; spends the winter in the s. of Europe or in Africa, and visits more northern regions in summer. It is of frequent occurrence in many parts of the British islands. It is seldom seen in the more cultivated and thickly peopled districts, but prefers mountain slopes, heaths, and their vicinity. It makes its nest generally in heathy banks, often under a bush. The nest is of coarse grass, within which is a thin shell of clay, and an inner lining of fine dry grass. The ring-ouzel is a constant visitor of gardens in the neighborhood of its haunts, committing great depredations, particularly when cherries are ripening. In Scotland it is known as the *moor blackbird*. It is of a dark brown color, almost black; the feathers edged with blackish-gray, the feathers of the wings more conspicuously edged with gray; a crescent-shaped white collar on the throat. The song consists of a few loud, clear, and plaintive notes.

RINGWORM is a popular term for several distinct forms of skin-disease which occur in patches of a circular or annular form on the body, and especially on the scalp. Thus, a species of lichen (q.v.), known to dermatologists as *lichen circumscriptus*, in which the papules assume a circular arrangement, is commonly regarded as ringworm; and the two species of herpes (q.v.), known as *herpes circinatus* and *H. iris*, in which the vesicles occur in circular patches and in concentric rings, are usually included in the same term. None of these are, however, cases of true ringworm (*tinea tondens*), which is a disease dependent on the presence of a special vegetable (fungous) parasite, now known to botanists as the *trichophyton tonsurans*, or hair-plant, and discovered in 1845 by Malmsten. It consists of oval transparent spores or globules, about $\frac{1}{7000}$ of an in. in diameter, for the most part isolated, but sometimes connected by articulated filaments. This fungus is seated in the interior of the hair-roots, and the hairs and the fungi simultaneously increase in size. The diseased hairs lose their elasticity and break when they have risen a line or two above the scalp. In these cases the short stump of hair soon loses all its characteristics. If the hair breaks before emerging from the scalp, a little prominence is formed, consisting of fungus, epidermis, and sebaceous matter, and the assemblage of such little prominences gives the scalp the rough appearance known as goose-skin. This parasite exists, according to Dr. Aitken—whose *Science and Practice of Medicine* contains an excellent abstract of all that is known regarding parasitic diseases—"in the *herpes tonsurans* of Cazenave, which is the *porrigo scutulata* of Willan, the *tinea tonsurans* of Bazin, and the *trichosis furfurans* of Erasmus Wilson and Dr. Wood." There are three varieties of true ringworm, which are described by Aitken under the following names: 1. Ringworm of the body (*tinea circinatus*); 2. Ringworm of the scalp (*tinea tonsurans*); and 3. Ringworm of the beard (*tinea sycosis*).

1. *Ringworm of the body* first appears as a rose-colored and slightly elevated spot about the size of a fourpenny-piece, on which a bran-like desquamation of epidermis soon begins, accompanied by slight itching. This spot gradually increases in size, but retains its circular form; and as it extends, the healing process commences at the center, so that the circular red patch is converted into a ring, inclosing a portion of healthy skin; and a ring thus formed may continue to increase till it reaches a diameter of four in., or even more. It is apt to affect the face, the neck, the back, and the outside of the wrist. This form of ringworm frequently terminates spontaneously.

2. *Ringworm of the scalp* usually occurs in children, and is especially prevalent when the nutrition is defective, or there is a scrofulous taint in the constitution. It appears in

the form of round, scaly, irritable patches on different parts of the head; and the irritation often occasions the formation of minute vesicles. The hairs at these spots become dry and twisted, and are easily extracted; and when the disease advances, they break close to the scalp if an attempt is made to extract them. The stumps, and the epidermis surrounding them, become covered with a characteristic grayish-white powder, consisting of the sporules of the fungus. The diseased parts are slightly elevated and puffy, and differ from the healthy scalp in color, being bluish or slate-colored in dark persons, and grayish-red or yellow in fair patients. The inflammation will last as long as the growth of the fungi continues; and even when they die spontaneously, as sometimes occurs, the affected spots remain permanently bald, in consequence of the hair-bulbs having become obliterated.

3. *Ringworm of the beard* is chiefly met with on the chin, hairy part of the cheeks, and upper lips of men; but it occasionally attacks the axillæ and pubic region of women. It commences like ringworm of the body, but when the deeper structures become affected, pustular indurations, resembling acne (q.v.), occur, and the hairs become readily detached. On examining the hairs under the microscope, it is seen that they are thickened; that their bulbs are partially disorganized; and that the medullary portion is atrophied.

The essential point in the treatment of all the varieties of true ringworm is to apply to the roots of the hairs a preparation which will destroy the fungus; but before this can be done the hair must be removed, if the disease has not already effected the removal sufficiently. This is best effected with small pincers about 3 in. long, and constructed so that the two extremities, which should be a couple of lines broad, shall come together very exactly. Or, in place of using the forceps, an ointment, composed of lime and carbonate of soda, of each 1 part, and 30 parts of lard, may be applied, which will soon remove the hair. French dermatologists recommend the application of "l'huile de cade." or "oil of pitch," obtained by the dry distillation of the wood of the *juniperus oxycedrus*, to the part from which the hairs are to be removed, believing that it lessens the sensibility, and tends to loosen the attachment of the hair. In order to destroy and remove the plant, lint dipped in a solution of sulphurous acid should be continuously applied—sulphurous acid being probably the most energetic parasiticide at present known. Among the solutions that have been applied with the same object, may be mentioned that of corrosive sublimate, 1 part to 250 of water. The general health must be at the same time attended to, and the internal use of cod-liver oil may usually be advantageously combined with the local applications.

Ringworm in the lower animals, as in the human subject, consists of the growth of a vegetable fungus on the surface of the skin, is common amongst young animals, is decidedly contagious, and communicable from man to the lower animals, and probably, also, from the lower animals to man. Commencing with a small itchy spot, usually about the head or neck, or root of the tail, it soon spreads, producing numbers of scurfy circular bald patches. It is unaccompanied by fever, and seldom interferes seriously with health. After washing with soap and water, run over the spots lightly every day with a pencil of nitrate of silver, or rub in a little of the red ointment of mercury, or some iodide of sulphur liniment.

RINNS OF GALLOWAY. See Wigtonshire.

RIO ARRI'BA, a co. in n.w. New Mexico; drained by the Rio Grande del Norte and its branches; pop. '70, 9,294. The surface is varied, in great part mountainous; corn, grass, and wool are the staples; cattle raising is carried on. Co. seat, Plaza del Alcalde.

RIOBAMBA, a t. of Ecuador, 100 m. s. from Quito, situated among the Andes, on an affluent of the Pastasa, a large branch of the Amazon. It is sometimes called New Riobamba, having been built instead of a former town of the same name, which was destroyed by an earthquake in 1797, and the ruins of which are 9 m. distant, at the foot of Chimborazo. Pop. about 16,000, in great part consisting of Indians.

RIO BRANCO, a river of Brazil, the largest affluent of the Rio Negro, rises near the sources of the Orinoco, in lat. about 3° n., long. about 64° west. It flows first e. to long. 61° w., and then s.s.w. to the Rio Negro, which it joins after a course estimated at 700 m. in length. At its junction with the Negro it is upward of a mile in breadth, and its lower course resembles a string of lakes connected by narrow canals. Its navigation is much impeded by rapids and waterfalls.

RIO BRAVO DEL NORTE, or Rio Grande. See Bravo del Norte.

RI'O DE JANEI'RO, a maritime province in the s.e. of Brazil, bounded on the s. and e. by the Atlantic. Area, 26,530 sq.m.; pop., without the city, '72, 782,724. The coast on the n.e. is low and lined with lagoons; but in the s. the scenery of the shores is unusually beautiful. Mountain ranges occupy the middle of the province, among which the peaks of the Organ mountains, rising to from 6,000 to 7,000 feet, are conspicuous. Of the rivers the Parahiba is the chief. The soil is fertile, and the principal productions are sugar, coffee, cocoa, cotton, rice, and maize. The province is traversed by a railway. The capital is Praia Grande, or Netherohy, which, including the district of

St. Domingo, contains about 25,000 inhabitants. The largest and most important town, however, is Rio de Janeiro (q.v.).

RIO DE JANEIRO, generally called Rio, the capital of the Brazilian empire, and the largest and most important commercial emporium of South America, stands on a magnificent harbor, 75 m. w. of cape Frio, in lat. 22° 54′ s., long. 43° 15′ west. The harbor or bay of Rio de Janeiro, said, and apparently with justice, to be the most beautiful, secure, and spacious bay in the world, is landlocked, being entered from the s. by a passage about a mile in width. It extends inland 17 m., and has an extreme breadth of about 12 miles. Of its numerous islands, the largest, Governor's island, is 6 m. long. The entrance of the bay, guarded on either side by granite mountains, is deep, and is so safe that the harbor is made without the aid of pilots. On the left of the entrance rises the peak called, from its peculiar shape, Sugar-loaf mountain; and all round the bay the blue waters are girdled with mountains and lofty hills of every variety of picturesque and fantastic outline. The harbor is protected by a number of fortresses. The city stands on the w. shore of the bay, about 4 m. from its mouth. Seven green and mound-like hills diversify its site: and the white-walled and vermilion-roofed houses cluster in the intervening valleys, and climb the eminences in long lines. From the central portion of the city, lines of houses extend 4 m. in three principal directions. The old town, nearest the bay, is laid out in squares; the streets cross at right angles, are narrow, and are paved and flagged; and the houses, often built of granite, are commonly two stories high. West of it is the elegantly built new town; and the two districts are separated by the Campo de Santa Anna, an immense square or park, on different parts of which stand an extensive garrison, the town-hall, the national museum, the palace of the senate, the foreign office, a large opera-house, etc. From a number of springs which arise on and around mount Corcovado (3,000 ft. high, and situated 3½ m. s.s.w. of the city), water is conveyed to Rio de Janeiro by a splendid aqueduct, and supplies the fountains with which the numerous squares are furnished. Great municipal improvements have within recent years been introduced; most of the streets are now as well paved as those of the finest European capitals; the city is abundantly lighted with gas; and commodious wharfs and quays are built along the water edge. Rio de Janeiro contains several excellent hospitals and infirmaries, asylums for foundlings and female orphans, and other charitable institutions, some richly endowed; about 50 chapels and churches, generally costly and imposing structures, with rich internal decorations, and several convents and nunneries. In the college of Pedro II., founded in 1837, the various branches of a liberal education are efficiently taught by a staff of 8 or 9 professors; the Imperial academy of medicine, with a full corps of professors, is attended by upward of 300 students; there is also a theological seminary. The national library contains 100,000 vols. The trade and commerce of Rio de Janeiro is great, and is annually increasing. In 1872–73 the value of exports from Rio de Janeiro was £10,528,655, consisting of coffee, £9,609,745; gold in bars and dust, £421,690; diamonds, £117,480; tobacco. £104,400; hides, £96,816; cotton, £81,696; timber, £55,000; sugar, £26,710; rum, £13,750; horse-hair, india-rubber, and wool,. £1800. In 1875–76 the shipments of coffee alone amounted to £8,891,138. The value of imports, consisting of silk, linen, cotton, and woolen goods, iron, etc., was £9,000,000 in 1877. In 1877, 3,411 foreign vessels, of 1,657,452 tons, entered and cleared the port. Steam communication with other ports of Brazil is frequent; European steamships arrive and depart almost daily, and there is telegraphic connection with Europe. The capital and its environs are served by two railways and 8 different. lines of tramway. Pop. '72, 274,972. .

The vicinity of Rio de Janeiro was first settled by the French in 1555, but was occupied in 1567 by the Portuguese, who founded the present city, and gave to it the name of St. Sebastian. For the space of 140 years after its foundation, the city enjoyed a state of tranquil prosperity, and in 1763 it superseded Bahia as the seat of government, and became the residence of the viceroys of Portugal. On the proclamation of independence in 1822 (see BRAZIL), Rio de Janeiro became the capital of the Brazilian empire.

RIO GRANDE, a name sometimes applied to the upper course of the river Parana (q.v.) in Brazil.

RIO GRANDE, a river of Senegambia (q.v.).

RIO GRANDE, or RIO GRANDE DEL NORTE. See BRAVO DEL NORTE.

RIO GRANDE, river in Bolivia. See GUAPEY, *ante*.

RIO GRANDE, a co. in s. Colorado; drained by the Rio Grande river and its creeks; pop. '80, 1944—1664 of American birth. The surface is traversed by the San Juan range, of which the highest peak, Pintada, is over 13,000 ft. high. The San Juan gold mines are very rich. Co. seat, Del Norte.

RIO GRANDE DO NORTE, a small maritime province of Brazil, occupies the n.e. angle of the country, and is bounded on the n. and e. by the Atlantic. Area, 22,000 sq.m.; pop. '72, 233,979. It derives its name from a river, formerly called the Rio Grande, and now called the Potengi, which flows into the Atlantic at Natal; but the principal river is the Piranhas. The surface is flat along the shores, which are skirted by many dangerous shoals, but is hilly and mountainous in the interior. Salt is obtained in large quantity from a number of salt lakes, and building-stone is abundant. The soil, generally sterile, is fertile on the river-banks. The principal crop raised is cotton, and large herds of horses and cattle are reared on the pastures, which are extensive. Cotton to the value of £77,000 was exported in 1878. The capital is Natal (q.v.).

RIO GRANDE DO SUL, or, to give the name in full, SAO PEDRO DO RIO GRANDE DO SUL, a maritime province of Brazil, constituting the extreme s. portion of the empire of that name. It is bounded on the n. and w. by the river Uruguay, on the s.w. by the republic of Uruguay, and on the s.e. by the Atlantic. Area, 85,239 sq.m.; pop. '72, about 455,000. The central districts are occupied by a range of mountains, which runs almost parallel to the Uruguay, and from which the land falls away into plains toward the Uruguay on the w., and the Atlantic on the east. Between the mountains and the flat coast regions are the large lakes Merim and Des Patos—the latter, 175 m. long and about 40 m. broad. Its salubrity of climate and fertility of soil admirably adapt it for European immigration. The great wealth of the province is in its flocks and herds, which are reared in great numbers on the *campinas* or prairies. It is stated that 500,000 cattle, whose hides and flesh are preserved, are slaughtered here annually, while as many more are driven northward for ordinary consumption. All the cereals and fruits of central Europe can be grown here advantageously, and the inhabitants are awakening to the importance of developing the immense agricultural resources of the province. A considerable area is now covered with crops of maize, beans, wheat, and potatoes, and the agricultural products, which, till recently, were of little account, now form one-eighth of the whole exports. The gold mines of the province have yielded in one year 6,100 ounces, the value of which is stated at £25,000. The principal articles of export of the province are beans, horns, hair, cattle and horse hides, grease and tallow, jerked or dried beef, tongues, mandioc, flour, and maize. Of the most of these articles, the quantity exported has increased so rapidly as in a few years to be considerably more than doubled. Half of all the imports of the province consists of cotton, woolen, and linen manufactures, coals, earthenware, and hardware from Great Britain. The principal towns are Porto Alegre (q.v.) and Sao Pedro. The latter, a small but prosperous and increasing seaport at the s. extremity of the lake Des Patos, and close to the sea, imported in 1872–73 goods to the amount of £365,300, while its exports in the same year amounted to £1.106,900. The arrivals from foreign ports were 929 vessels, of 198,029 tons; the departures 698 vessels, of 212.936 tons. The arrivals from Brazilian ports were 840; tonnage, 221,213; the departures, 890; tonnage, 185,060. Three lines of steamers run to Porto Alegre.

RIOJA, LA, a province in the w. of the Argentine republic, bounded on the n. by Catamarca, on the e. by Cordova, on the s. by San Luis, and the w. by Chili; drained by the Bermejo river, intersected by the Andes, Famatina, Rioja, and Jagüe ranges; about 35,000 sq.m.; pop. about 50,000. The surface is composed of great plateaus and valleys. Gold, silver, nickel, copper, tin, quartz, antimony, and other metals are found. The soil is fertile. The chief productions are cotton, wheat, corn, and fruits. Cattle, timber, dyes, and wax are exported. Among the manufactures are cotton and woolen goods, and leather. Capital, La Rioja.

RIPARIAN RIGHTS, in law, the rights of the proprietors of lands bordering on rivers or other natural water courses. The old common law definition of a navigable river, as one in which, and only as far as, the tide ebbs and flows, is rejected in this country, and the word navigable is used in its wider sense. The state, in case of navigable rivers, has control of the shore below high water mark, or, if not tidal, below the average water line, and may control the erection of wharves or other constructions, though the public are not to be restrained in the exercise of the privileges of fishing and navigation. It follows that no obstruction is allowed except by the consent of the legislature. Unnavigable streams are sometimes called private rivers. The proprietors on either side own the bed of the stream up to the middle line. The bed cannot therefore be widened or enlarged so as to bring the river into public use without compensation to the riparian proprietors. But the latter have no ownership in the water itself but only the right of use. They may therefore employ the stream for purposes of industry or ornamentation but must not interfere with similar rights of proprietors above or below, or overflow and damage their lands. They may divert it from its natural channel while passing through their land, but must restore it thereto at its exit. If the land on the oppposite sides be owned by different parties, their right to the use of the water is an undivided one, and one party cannot deprive the other of the use. Some states have passed statutes allowing the owners of certain kinds of manufactories or mills to acquire the right of flowing the lands of others by damming the stream, under the power of eminent domain and through commissions appointed for that purpose. *Alluvion*, the soil added to a shore by gradual natural processes, is the property of the owner of such shore. But where *avulsion*, the sudden removal of large quantities of the soil from the land of one owner to another occurs, the title to such land does not change. So, if the stream change its course, the former boundary is not changed but the whole river bed may become the property of him through whose land it flows.

RIOM, a small t. of France, in the dep. of Puy-de-Dôme, is picturesquely situated on a hill, 1173 ft. above the sea, 8 m. n.n.e. of Clermont. It is built of dark lava, and is a perfect treasure of domestic architecture, especially of the renaissance period. Linen, leather, and brandy are manufactured. Pop. '76, 8,733.

RI'O NE'GRO, one of the principal affluents of the Amazon, rises in an unexplored district of the s. of the United States of Colombia (New Grenada), flows in a general s.s.e. direction, and joins the Amazon at Manaos, after a course estimated at 1000 m. in length. It receives from the n. the Cassiquiare (q.v.), by means of which communication is established between the Orinoco and the Amazon; also the Cababuri, Padaviry, Branco, and other large streams; from the s. comes its greatest affluent, the Vaupes. It is 1¼ m. broad when it enters the Amazon.

RIO NEGRO, a river of South America, forms the greater part of the boundary between the Argentine republic and Patagonia. At its source, it is called by the natives Melly-roumey-co—i.e., *four small rivers*—from the fact that it is formed by four head-waters from the bosom of the Cordilleras. It is afterward called by the natives Couroun-roumey-co, or Black river (Span. Rio Negro), from the dark color of its waters, caused by the depth and narrowness of its channel. It flows first n.e., then e. and s.e. through the plains to the Atlantic, into which it falls in lat. 41° 3' s., after a course of upward of 700 miles. Shoals and islands obstruct its channel, and it is navigable only for 20 m. above its mouth.

RIONE'RO, a large t. of southern Italy, in the province of Potenza, 7 m. s. of Melfi; pop. 12,051. It produces grain, maize, pulse, and wine. The inhabitants are agriculturists and shepherds. There is a great trade carried on in maple snuff-boxes, which are manufactured here.

RIOSE'CO, MEDINA DE, a small t. of Spain, in the province of Valladolid, and 26 m. n.w. of the city of that name, stands on two hills in a fertile district. In the middle ages it was the center of considerable trade, but it has much declined in recent times. The chief church is that of Santa Maria, a beautiful Gothic edifice, richly decorated, and containing several excellent pictures. Here, in 1808, a Spanish army, 50,000 strong, under Blake and Cuesta, was defeated, with a loss of 6,000 men, by 12,000 French troops under Bessières. The chief result of this battle was that Joseph Bonaparte was placed on the throne of Madrid. After the defeat, the unresisting town was sacked with more than wonted barbarity. Pop. about 4,500.

RIOT is the legal name of an offense which consists in the assembling of three or more persons for an illegal purpose, or for the carrying out of a legal purpose in an illegal manner. Riots often commence in some supposed private wrong. Some degree of violence is incidental to a riot, and a degree of intimidation to the neighborhood. A riot cannot take place unless at least three persons act in concert. When a riot becomes formidable, it is usual for the authorities to take active measures to disperse it. Thus, any justice of the peace may command the persons assembled to disperse peaceably by a form of words called reading the riot act, which is as follows: "Our sovereign lady the queen chargeth and commandeth all persons being assembled immediately to disperse themselves, and peaceably to depart to their habitations, or to their lawful business, upon the pains contained in an act of King George for preventing tumults and riotous assemblies.—God save the queen." If the rioters, after this formal proclamation, remain more than one hour afterward, they are guilty of felony, and may be seized and carried before a justice. Sometimes it is difficult to distinguish between an illegal assembly and one which is legal, though noisy and tumultuous, and the opinion of the justice of the peace is not conclusive as to its illegality. Sometimes the riot act is read more than once during the disturbance, in which case the second or third reading does not supersede the first.

RIOUW', a Netherlands residency or government in the eastern archipelago, since Siak and dependencies were taken from it, consists of the peninsula of Tandjong Pinang, the Lingga-Riouw archipelago, a part of the coast of Sumatra, n. of Djambi, and the adjoining kingdom of Indragiri; also the Tambilan, Anambas, and Natuna islands. Area, about 3,000 sq. miles. Pop. '73, of the residency, 69,386, including 144 Europeans, 27,782 Chinese (25,678 being males), and 41,308 natives.

The islands of the archipelago are mountainous, the peak of Lingga rising to 3,712 feet. Many of them are covered with heavy timber and a dense underwood, through which it is difficult to force a way. As far as is known, the prevailing rocks are granitic and sandstone. Gold is found in Lingga, and tin was formerly extensively wrought; but the richer mines of Sinkep and the Carimon islands, in the southern entrance of the strait of Malacca, now yield the largest amount of that ore. Coal is also found in the Riouw-Lingga islands.

The climate is not considered unhealthy, though at times the heat is intolerable. The chief products are sago, pepper, damar resin, gambir, gutta-percha, rattans, cotton, fruits, and many varieties of fine timber. Edible nests are found in abundance, and the waters swarm with fish. Agar-agar, tripang or bêche-de-mer, and shell-fish are largely collected. The native Malays chiefly gain a living by fishing, and the Chinese have extensive *uncaria gambir* and pepper gardens. Imports, 1872, £372,422; exports, £369,213.

The industries are manufacturing gambir, distilling arrack, weaving silks, ship-building, wood-cutting, tile and brick making, together with extensive fisheries. The original inhabitants are Malays, who are more numerous in Lingga than the other islands. The strangers are Europeans in the pay of the Netherlands colonial government, Chinese, Buginese, and Javans. The town is at the n.w. end of Tandjong Pinang, 54' 4" n. lat., and 104° 26' 30" e. long., in a beautiful bay where there is safe anchorage. Pop. 8,609. —See *Journal of the Ind. Archip.* vol. i.; Crawford's *Descriptive Dict.; De Residentie Riouw* door J. J. de Hollander; and colonial reports of 1875–76.

RIPLEY, a co. in s.e. Indiana, crossed by the Ohio and Mississippi, and the Indianapolis, Cincinnati and Lafayette railroads; drained by Laughery creek; 450 sq.m.; pop. '80, 21,627. The surface is undulating, the soil fertile, and limestone is found in some parts. The chief productions are grain, hay, tobacco, wool, hops, and sorghum. Sheep and swine are raised. There are numerous carriage, wagon, saddlery, and harness manufactories, tanneries, flour, and saw mills. Co. seat, Versailles.

RIPLEY, a co. in s. Missouri, bordering on Arkansas; drained by the Current and Little Black rivers; 600 sq.m.; pop. '80, 5,377—5,277 of American birth; 10 colored. The surface is hilly, and heavily wooded; wheat, oats, corn, and hay are the staples. Co. seat, Doniphan.

RIPLEY, Eleazer Wheelock, 1782–1839; b. Hanover, N. H.; son of Sylvanus Ripley, D.D., professor of divinity in Dartmouth college, and nephew of pres. John Wheelock. He was a graduate of Dartmouth, 1800; in 1811 removed to Maine and practiced law in Portland; was a member of the Massachusetts legislature, speaker of the house, and state senator 1810–12. In the war of 1812 he was commissioned lieut.col. and col., and was wounded at York, N.C. He commanded the 2d brigade, under gen. Brown, in the battles of Chippewa and Niagara; wounded in the latter, and brevetted maj.gen. He fought gallantly in the defense of fort Erie, was wounded in the neck, and for his bravery was presented by congress with a gold medal bearing the legend, *Niagara, Chippewa, Erie.* He left the army in 1820, resumed the practice of law in Louisiana, and represented his state in congress 1835–39.

RIPLEY, George, LL.D., 1802–80; b. Mass.; graduated at Harvard college in 1823, and the divinity school in 1826; pastor of a Unitarian church in Boston 1826–28; associate editor with Ralph Waldo Emerson and Margaret Fuller of the *Dial* 1840–41; one of the editors of the *Harbinger*, a Fourierite paper, 1844–48; prominent in the socialist experiment at Brook Farm, Roxbury, 1844–46. In 1847 he removed to New York, and was the literary editor of the New York *Tribune* until his death. He was also one of the editors of Appleton's *New American Cyclopædia.* He published a dissertation on the *Philosophy of Religion;* Letters to Andrews Norton on *The Latest Form of Infidelity;* edited *Specimens of Foreign Standard Literature* 1838–42, 14 vols., and with Bayard Taylor, *Handbook of Literature and the Fine Arts* 1852–57. He contributed to the *Christian Examiner*, and *Putnam's* and *Harper's Magazines.* He was an admirable writer, with wide literary knowledge and fine taste. His criticism was not noted for severity.

RIPLEY, Henry Jones, D.D., 1798–1875; b. Mass.; graduated at Harvard college in 1816, and Andover theological seminary in 1819; ordained in Boston as an evangelist, and was pastor for 7 years of the North Newport Baptist church in Liberty co., Ga.; elected in 1826 professor of Biblical literature and pastoral duties in Newton theological institution; became in 1839 professor of sacred rhetoric and pastoral duties, resigning in 1860. Subsequently he preached among the freedmen of Georgia. Returning to Newton he was made librarian of the seminary. He published several theological treatises.

RIPLEY, James W., 1794–1870; b. Conn.; educated at West Point. After serving in the artillery, he was transferred to the ordnance department in 1832, in which he remained till his retirement from the service in 1863, being its chief 1861–63. He took part in the war of 1812 and the Seminole war.

RIP'ON, a city in s.e. Wisconsin, on the Sheyboygan and Fond du Lac railroad at its junction with the Chicago, Milwaukee, and St. Paul; pop. '70, 3,501. It is pleasantly situated on Green lake, an inlet 9 m. in length, 20 m. n.w. of Fond du Lac, and 19 m. s.w. of Oshkosh. It is the seat of Ripon college (Congregational), has 9 churches, 2 public halls, 3 hotels, 2 newspapers, and is lighted by gas. The leading industries are the manufacture of carriages, flour, pickles, and wagons.

RIP'ON, a market t., and municipal and parliamentary borough, in the West Riding of Yorkshire, 23 m. n.w. of York. The market-place, to which the four principal streets lead, is spacious, surrounded by good houses and shops, and has in its center an obelisk 90 ft. high. Ripon is a bishop's see. The cathedral, founded 1109–14, is cruciform, is surmounted with two uniform towers, 110 ft. high at the w. end, and also by a center tower. It is esteemed one of the best proportioned churches in the kingdom. Trinity church, built in 1826, is a fine cruciform edifice in early English. There are other places of worship, two hospitals, and a number of important schools, one of which, the grammar-school, has an endowment of £600 a year. The principal branches of industry are machine-making, tanning, malting, and brass and iron founding. There are also several flour-mills and varnish factories. Pop. '71, 6,806.

RIPON, George Frederick Samuel **ROBINSON**, D.C.L., Marquis of; b. London, 1827; son of viscount Goderich to whose title he succeeded in 1859. He was returned to parliament in 1852, where he served till his succession to the upper house. On the death of sir G. C. Lewis he became secretary for war, and entered the cabinet. In 1866 he was appointed secretary of state for India. He became lord president of the council on Gladstone's accession to office in 1868. In 1871 he was chairman of the high joint commission which resulted in the treaty of Washington, and on his return from the United States was created marquis. In 1874 he was received into the Roman Catholic church. In 1881 he succeeded lord Lytton as viceroy of India.

RIPPLE-MARK. Undulations similar to those observed on sandy shores, and produced by the particles of sand being drifted along by the water, have been observed on the surface of sandstones of all ages. They may be held generally as indicating that the deposition of the bed on which they occur took place on a sea-beach, or under water not more than 10 ft. deep. Recent ripple-marks have, however, been observed at a depth of 60 ft., and there is reason to believe that mud and sand may be disturbed at much greater depths by currents of water. Loose sand also may be driven by the wind into ripple-waves, that cannot be distinguished from those produced by the receding tide.

R'ISHI (from the obsolete Sanskrit *r'ish*, see, kindred with *dr's'*,- δερκ-) is the title given to the inspired poets of the Vedic hymns, as they were supposed to have "seen," or, in other words, received, the Vedic hymns from the deity through the sense of sight. "The R'ishis," Yâska (q.v.) says, "see the hymns with all kinds of intentions." They were therefore the oldest poets of India, and the word R'ishi itself becomes thus even identified with Vedic poetry. At a later period, however, the title R'ishi was given to renowned authors, though they were not considered as inspired by a deity, as, for instance, to the authors of the Vedic Kalpa, works which, by all Hindu writers, are admitted to be of human authorship.—Compare Goldstücker, *Pân'ini*, etc., p. 64, ff.

RISING, in heraldry, a term applied to a bird when represented opening his wings as if about to take flight.

RISING IN THE AIR. The name of a belief (prevalent in the middle ages) that the bodies of holy persons were sometimes lifted up and suspended in the air during the continuance of a religious ecstacy. Calmet states in his work on Apparitions that this singular phenomenon might be produced by the fervor of the Holy Spirit; by the ministry of good angels; or by a miraculous favor of God, who desired thus to do honor to his servants in the eyes of men. Numerous instances are recorded in the *Acta Sanctorum*. St. Philip of Neri, in his religious ecstacies, was elevated in the air, sometimes to the height of several yards, almost to the ceiling of his room, and this quite involuntarily. He tried in vain to hide it from the knowledge of those present, for fear of attracting their admiration. St. Ignatius de Loyola was sometimes raised up from the ground to the height of 2 ft., while his body shone like light. St. Robert de Palentin rose also from the ground sometimes to the height of a foot and a half, to the great astonishment of his disciples and assistants. In the life of St. Dunstan it is stated that, a little time before his death, as he was going up stairs to his apartment, accompanied by several persons, he was observed to rise from the ground; and as all present were astonished at the circumstance, he took occasion to speak of his approaching death. In a recent biography of Girolamo Savonarola, it is also stated that while that martyr was in prison, shortly before his execution, he was observed once, while in prayer, raised from the ground, and was seen distinctly suspended in the air for some short period.

These relations account for the frequency with which representations of saints are exhibited in an aërial position in mediæval paintings and works of art. This belief falls in with one of the alleged phenomena of modern Spiritualism (q.v.).

RISK, in point of law, is used chiefly in reference to the sale of goods, and injury or loss to the goods before delivery. On such occasions, the question, in English law, is governed by the previous question, whether the property has passed or not by the sale. If it has, then whoever is the owner must bear the loss of the goods. In Scotland, the risk is with the buyer of goods, whether the right of property has passed or not. See Carrier.

RISOT'TO, an elegant Italian dish, consisting chiefly of rice. Onions are shredded into a frying-pan with plenty of butter, and they are fried together until the onions become very brown, and communicate their color to the butter. The butter is then run off, and to this is added some rich broth, slightly colored with saffron, and the whole is thickened with well-boiled rice, and served up instead of soup, at the commencement of a dinner.

RISSOLE, a culinary preparation used as an *entrée*. It consists of meat or fish of any kind finely minced and made into small forms, which are then coated with a very thin crust either of pastry or of bread-crumbs, mixed with yolk of egg, and fried. There is great variety in this dish.

RISTORI, Adelaide, a celebrated Italian tragic actress, was b. in 1821 at Cividale in Frioul. Her parents were strolling players, and she almost began life in the theater. At the age of 14 she played in *Francesca da Rimini*, and in a few years became the leading Italian actress. Her talents, her beauty, and her grace made her a universal favorite. In 1847 her marriage with the marquis Capranica del Grillo (who died in 1861) temporarily interrupted her dramatic career; but after two years she returned to the stage, and appeared at Rome in 1849 in Alfieri's tragedy of *Myrrha*. But the French attack on the city caused her to desert the theater for the hospital, where she employed herself assiduously in nursing the wounded. After having acted in 1850 and succeeding years at Rome and Turin in various characters of Alfieri with immense applause, she presented herself before a French audience in 1855, when Rachel was in the height of her fame, a proceeding considered in the light of a challenge by the first Italian actress to the first French actress. Even at Paris she obtained a triumph, her genius creating an enthusiasm which could not be repressed. Without all the sympathetic sensibility of Mme. Rachel, she surpassed her in vivacity and expression. She has since appeared with success in England, the United States, etc.

RITCHIE, a co. in n.w. West Virginia; drained by the n. and s. forks of Hughes river; traversed by a division of the Baltimore and Ohio railroad; 330 sq.m.; pop. '80, 13,474—13,236 of American birth, 64 colored. The surface is uneven and the soil moderately fertile; wheat, hay, oats, corn, maple sugar, and dairy products are the staples. Co. seat, Harrisville.

RITCHIE, Anna Cora (Mowatt), 1819–70; b. Bordeaux, France; daughter of S. G. Ogden of New York; came to this country and at 15 years of age married James Mowatt, a lawyer in New York. She visited Europe on account of failing health; sufficiently recovered, she appeared in private theatricals, and then in public readings: studied for the stage and made her *début* in the *Lady of Lyons*, at the Park theater; playing an engagement at the Howard Athenæum, Boston, 1845. In 1847 she played in Manchester and Dublin, and was leading lady at Marylebone theater, acting with E. L. Davenport through many engagements. Her husband having died abroad, she retired from the stage in 1851, returned to America, and in 1854 married W. F. Ritchie, editor of the Richmond *Examiner*. He died in 1868, and she thenceforth resided in England and corresponded for American newspapers. She published several novels and plays; also compilations in prose and verse.

RITCHIE, Thomas, 1778–1854; b. Va.; became editor of the Richmond *Examiner* in 1804. He changed its name to *Enquirer*, and remained its editor and proprietor till 1845, when he removed to Washington, where he founded the *Union* as the official organ of Polk's administration. His last years were passed in Richmond. The *Enquirer* under his management was the leading journal in the south.

RITE (Lat. *ritus*) is in general an external sign or action employed in religious use, and designed either to express or to excite a corresponding internal religious feeling. Such are, for instance, the uplifting or outstretching the hands in prayer, the imposition of hands in blessing, etc. The ancient Jewish religion abounded with rites and ceremonies, and through their excessive multiplication in the religions of the Gentiles, religion degenerated almost entirely into outward form. A marked distinction in this respect is drawn by our Lord (John iv. 23) between the old and the new law, which one class of Christians have interpreted as a condemnation of all external ceremonial, while even those who contend for the retention of ceremonies in Christian worship require that their use should always be accompanied and elevated by the corresponding internal spirit. The great ground of difference in the Puritan controversy in England and the corresponding disputes in continental churches, was the lawfulness of ceremonies. See Genuflexion, Puritan.

The name rite is sometimes used to signify the aggregate of all the ceremonies used in a particular religious office, as the "rite" of baptism or of the eucharist. In a still wider sense it is used of the whole body of distinctive ceremonial, including the liturgy employed by a particular community of Christians. In this way we speak of the "Roman rite," the "Greek rite," the "Syrian rite," the "Armenian rite," the "Coptic" or the "Slavonic rite."

RITENU'TO (Ital. kept back), a term in music implying that the speed of the movement is to be diminished.

RITES, CONGREGATION of, a committee of cardinals in the Roman Catholic church, founded by pope Sixtus V. The number of members is determined by the reigning pope. At first it was composed of 6 cardinals, with several secretaries and consulters. In 1875 it had 17 cardinals, 25 consulters, and 11 officials. It takes cognizance of the liturgy, the rites pertaining to the sacraments, the rubrics of the missal and breviary, the ceremonies of the church in its public functions, and the canonization of saints. The congregation meets at the house of the prefect who is the senior cardinal of the committee.

RITNER, Joseph, 1780–1869; b. Penn.; received little school education. He entered politics about 1820, became a leader of the anti-masonic party about 10 years later, and after running unsuccessfully three times, was elected governor in 1835, and remained in that office till 1839. In 1849 he was appointed director of the Philadelphia mint. He was an advocate of "total abstinence" and antislavery.

RITORNELLO (Ital. return), in music, in its original sense, a short repetition like that of an echo, or a repetition of the closing part of a song by one or more instruments.

The same term has, by later usage, been applied to all symphonies played before the voices begin which prelude or introduce a song, as well as the symphonies between the members or periods of a song.

RITSCHL, Friedr. Wilh., one of the first (perhaps the very first) classical philologists of modern times, was b. at Grossvargula in Thuringia, April 6, 1806. He studied at Leipsic under Hermann, and from 1828 to 1829 at Halle, where he eagerly availed himself of the lectures and society of Reissig. In 1832 he was called to Breslau as extraordinary professor, receiving at the same time a joint-directorship of the philological seminary there. Two years afterward he became ordinary professor, and spent the winter and spring of 1836–37 on a learned tour through Italy. In 1839 he accepted an invitation to Bonn as professor of classical literature and rhetoric. The Prussian government conferred on him the rank of privy-councilor in 1856. His first literary works were devoted to the Greek grammarians, as the edition of Thomas Magister (Halle, 1832), the acute and penetrating treatise, *De Oro et Orione* (Bresl. 1834), and the richly elucidatory *Die Alexandrin. Bibliotheken und die Sammlung der Homerischen Gedichte durch Pisistratus* (Bresl. 1838), sufficiently prove; but by far his greatest work is his edition of Plautus (Bonn, 1848–53), executed with the richest critical apparatus. It was accompanied by a comprehensive *prolegomena* on the Plautinian meters. The work secured for him a splendid reputation among his countrymen. Among the numerous productions of Ritschl which may be regarded as preparatory to this *chef d'œuvre*, the most important is his *Parerga Plautina et Terentiana* (Leip. 1845). Subsequently his literary activity took another direction—viz., a systematic treatment of Latin inscriptions, with the view of illustrating the history of the Latin language. His labors in this department have been crowned with success, for Ritschl has thrown more light upon the successive phases of the language than any other single individual. To this field belong his *Lex Rubria* (Bonn, 1851); *Titulus Mummianus* (Berl. 1852); *Monumenta Epigraphica Tria* (Berl. 1852); *Inscriptio Columnæ Rostratæ* (Berl. 1852); *Anthologiæ Latinæ Corollarium* (Berl. 1853); *De Sepulcro Furiorum* (Berl. 1853); *De Fictilibus Litteratis, etc.* (Berl. 1853); *Poesis Saturninæ Spicelegium* (Bonn, 1854); *De Titulo Metrico Lambaesensi* (1855); *De Varronis Hebdomadum Libris* (1856); *In Legis Viselliam, Antoniam, Corneliam Observationes Epigraphicæ* (1860); and *Proœmiorum Bonnensium Decas* (1862). Besides these works Ritschl contributed a large number of learned dissertations to the programmes of the university of Bonn, in the *Transactions* of the archælogical institute of Rome, and in the *Rheinisches Museum für Philologie*. On the 25th anniversary of his appointment to Bonn, there began to be published *Symbola Philologorum Bonnensium in Honorem Frid. Ritschelii* (1864–67). In 1867 Ritschl, 30 of whose pupils were then professors in German universities, was appointed foreign associate of the French academy of inscriptions and belles lettres. He died in 1876.

RITSON, Joseph, 1752–1803; b. England; called to the bar, but gave his chief attention to literature. Among his works are *Remarks Critical and Illustrative on the Text of the last Edition of Shakespeare*, 1783, in which he attacks Dr. Johnson and Steevens; *A Select Collection of English Songs*, 1783; *Ancient Songs from the Time of King Henry III. to the Revolution*, 1790; *The English Anthology*, 1793–94; *Robin Hood*, 1795; and *Ancient English Metrical Romances*, 1795. He was a learned and accurate English scholar, but bitter in his numerous literary controversies.

RITTENHOUSE, David, ll.d., 1732–96; b. Penn.; the great-grandson of a Hollander, who established at Germantown about 1690 the first paper-mill in America. Before he was 17 he made a clock without having received any instruction, and in 1751 devoted himself to clock-making. In 1755 he made an orrery, which was purchased by Princeton college, and in 1768 he was engaged to determine the boundary-line since known as Mason and Dixon's, for which he used instruments of his own construction. Later he settled the boundaries between New York, New Jersey, Pennsylvania, and several other states. He was appointed by the American philosophical society to observe the transit of Venus, June 3, 1760; was treasurer of Pennsylvania 1777–89; succeeded Franklin as president of the philosophical society in 1791; and was director of the U. S. mint, 1792–95. His life has been written by William Barton; and also by James Renwick in Sparks's *American Biography*.

RITTER, Heinrich, German philosopher, was born at Zerbst in 1791; studied theology at Halle, Göttingen, and Berlin from 1811 to 1815, and in 1824 was created professor extraordinarius at Berlin university. In 1835 he accepted a call to the university at Kiel, and went thence in 1837 to Göttingen. Ritter owes his literary fame especially to his profound works on the history of philosophy. The principal are *Ueber die Bildung des Philosophen durch die Geschichte der Philosophie* (On the Education of the Philosopher through the History of Philosophy), 1817; *Welchen Einfluss hat die Philosophie des Cartesius auf die Ausbildung der des Spinoza gehabt?* (What Influence has the Philosophy of Descartes exercised on that of Spinoza?) Leip. and Altenb. 1817; *Ueber die Philos. Lehre des Empedokles* (On the Philosophical Doctrine of Empedocles), 1820, in Wolf's *Literary Analecta; Geschichte der Ionisch. Phil.* (History of the Ionian Philosophy), Berl. 1821; *Geschichte der Pythagorisch. Phil.* (History of the Pythagorean Philosophy), Hamb. 1826; *Bemerkungen üb. die Phil. d. Megarisch. Schule* (Remarks on the Philosophy of the Megaric School), Rheinisches Museum, 2d series; *Gesch. der Phil.* (History of Philosophy), vol. i.–xii. Hamb. 1829–53; 2d ed.. vol. i.–iv., 1836–38; *Vorlesungen zur Einleitung in die Logik* (Introductory Lectures to Logic), Berl. 1823; *Abriss der Philosophisch. Logik*, Berl. 1824; *Die Halb-Kantianer und der Pantheismus* (The Half-Kantians and Pantheism), Berl. 1827; *Ueber das Verhältniss der Philosophie zum Wissenschaftlichen Leben Ueberhaupt* (On the Relation between Philosophy and Scientific Life in General), Berl. 1835; *Ueber die Erkenntniss Gottes in der Welt* (The Recognition of God in the World), Hamb. 1836; *Ueber das Böse* (On Evil), Kiel, 1839; Philosophical Essays (Kiel, 1839–40); *System der Logik und der Metaphysik* (Gött. 1856); *Die Christliche Philosophie* (2 vols. Gött. 1858–59); *Encyclopädie der Philosophischen Wissenschaften* (vols. 1 and 2, Gött. 1862–63). Ritter was not a partisan of any philosophical school, but a critic of all. He died in 1869.

RITTER, Karl, an illustrious geographer, was b. Aug. 7, 1779, in Quedlinburg, in Prussia, studied in Halle, was nominated in 1820 professor extraordinarius of geography at Berlin university, became subsequently member of the academy, and director of studies at the military school. He died Sept. 28, 1859. With Ritter, as the founder of general comparative geography, begins a new epoch in the history of geographical science. His chief works are: *Die Erdkunde im Verhältnisse zur Natur und Geschichte des Menschen* (Geography in its Relation to Nature and the History of Men), 17 vols. Berl. 1822–54. The work is divided into 4 parts—1. Introduction and East Asia, in 5 vols., containing Middle Asia, High Asia, Siberia, China, and India, vol. ii.–vi.; 2. West Asia, in 5 vols. (vol. vii.–xi.); 3. Arabia (vol. xii.–xiii.); 4. The Sinai Peninsula, Palestine, Syria (vol. xvi.–xvii.), with 4 indexes, and an atlas of Asia. Introduction to an Essay on a more Scientific Treatment of Geography (Berl. 1852); *Europa, ein Geographisch., Historisch., Statistisches Gemälde* (Europe, a Geographical, Historical, Statistical Picture), 2 vols., Frankf. 1807; *Die Stupas, oder die Architect. Monumente, etc.* (The Stupas, or the Architectural Monuments on the Indo-Bactrian Royal Road, and the Colossus of Bamyan), Berl. 1838. Many of his antiquarian and historico-antiquarian researches are contained in the *Monatsberichten* of the Berlin geographical society, and in the *Zeitschrift für Allgemeine Erdkunde, etc.* Other noteworthy productions are: *Die Colonisirung von Neu Zealand* (Berl. 1842); *Blick auf das Nilquellland* (Berl. 1844); *Der Jordan und die Beschiffung des Todten Meeres* (Berl. 1850); *Ein Blick auf Palæstina und die Christliche Bevölkerung* (Berl. 1852).

RIT'UAL (Lat. *rituale*, a book [or collection] of rites), the name of one of the service-books of the Roman church, in which are contained the prayers and order of ceremonial employed in the administration of certain of the sacraments and other offices of the church. The ceremonial of the offices of the Roman church administered by bishops is contained in the books entitled *Pontificale* and *Ceremoniale Episcoporum*. The priestly offices are detailed in the ritual. In its present form it dates from the council of Trent, which directed a revision of all the different rituals then in existence, which were numerous, and exhibited considerable variety of detail. Paul V., in 1614, published an authoritative edition, which has frequently been reprinted, and of which a further revision was issued by Benedict XIV. Besides the Roman ritual, there are many diocesan rituals, some of which are of much historical interest. In the Greek church, as in the other eastern communions, the ritual forms part of the general collection (which contains also the eucharistic service) entitled *Euchologion*. In the Anglican church, also, the *Book of Common Prayer* may be said to contain the ritual. The most approved commentary on the Roman ritual is that of Barrufaldo (2 vols. Florence, 1847).

RITUALISM, the name popularly but inaccurately given to the remarkable increase of ceremonial in the church of England since the year 1863. It may be considered as a development of tractarianism, though it is one not contemplated by the authors of that movement, whose aim was rather to disseminate doctrines than to introduce ritual changes. Its collateral causes may be said to be: (1) The great advance of æsthetic taste, and the increased cultivation of the fine arts in the service of religion. (2) The extended study by the clergy of ancient liturgies, and the connection discovered to exist between them and the offices of the English church. With the spread of high-church principles, certain changes in the mode of conducting divine service had been introduced by the clergy, which, though unpopular at first, were widely adopted, and, up to a certain point, had received the sanction of the law. But the restored church with low and open benches—the separated chancel—the altar-table with coverings of different color according to the ecclesiastical seasons, and candlesticks, and a cross upon or over it—choral services, and weekly celebration of the communion, were all that had hitherto been attempted. To these comparatively small alterations, important additions have recently been made—viz. (1) Special vestments at the celebration of the holy communion, and at certain other times, viz., for the celebrant, an alb and stoles, of different color, and chasuble; for the assisting ministers, albs with tunicles, according to the seasons. At other times a cope is worn instead of a chasuble, (2) Lighted candles on the altar at holy communion. (3) Incense burned either in a "thurible" or in a standing vessel. (4) The mixing of water with wine for the communion. (5) The use of wafer-bread. (6) Elevation of the elements either during or after consecration. (7) The attendance of non-communicants at the holy communion. (8) Processions with crosses, banners, and vested attendants.

These innovations are defended by their promoters on the following grounds of (*a*) law, (*b*) doctrine, and (*c*) expediency.

(*a*) The rubric at the end of the calendar in the Book of Common Prayer enacts "that such ornaments of the church and of the ministers thereof at all times of their ministration shall be retained and be in use as were in this church of England by the authority of parliament in the second year of the reign of king Edward VI." The judicial committee of the privy council in the case of Westerton *v.* Liddell (1857), ruled that "ornaments" here means, "all articles used in divine service;" that the words "by authority of parliament," etc., refer to the first prayer-book put forth in that reign (1549); and that "the meaning of the rubric, as of the previous statute of Elizabeth, the language of which it adopts, is, that the same dresses, utensils, and articles which were used under the first prayer-book of Edward VI. may still be used." Now, the first prayer-book of Edward VI. prescribes that at the time of the communion "the priest that shall execute the holy ministry shall put on him a white alb plain with a vestment, i.e., a chasuble, or cope;" and the assistants "likewise the vestures appointed for their ministry, that is to say, albs with tunicles." It is therefore inferred that the above are the only legal vestments in which the holy communion should be celebrated. To this it is objected (1) That the word "retained" can only refer to such vestures as were in use up to the time of the last publication of the rubric—viz., the surplice in parish churches, and copes in cathedrals. (2) That the rubric, when first inserted under Elizabeth, was limited by the injunctions and advertisements of that reign, which aimed only at the restoration of the surplice. (3) That whatever be the intention of the rubric, it has been so long obsolete that it is absurd to revive it. It is answered (1) That the word "retained" must have the same meaning that it had in the rubric of Elizabeth, in which it first occurs. (2) That the injunctions and advertisements were not of supreme authority, and were only intended to help toward restoring a decent uniformity in divine worship. (3) That the fact that a law has become obsolete does not invalidate its force. The same reference of the ornaments rubric to the second year of Edward VI. is held to authorize other accessories known to have been in use at that time, though not specified in the first Prayer-book—such as lighted candles, incense, etc. And on the principle that the Reformed church was legally identical with that before the reformation—which the 30th canon of 1603 is cited as maintaining—it is further contended that all ancient laws and usages are still in force, except where directly or implicitly abrogated by subsequent enactment. And as the chief ritual authority before the reformation was the liturgy of Sarum (the Sarum "*use*" referred to in the preface to the present prayer-book), it is to that standard, as far as possible, that the more advanced ritualists desire to conform.

(*b*) The *doctrinal* grounds of defense are expressed in the following statements: (1) The eucharist (as the Lord's supper was anciently called) is the special institution of Christ, the single rite of continual observance which he enjoined on his disciples, and the chief act of Christian worship. It is therefore right to exalt and dignify it above all other services, and mark it as standing on different and higher ground than any other institution. (2) The eucharist, according to the universal belief of the ancient church, is to be regarded as a sacrifice, *commemorative*, as the Jewish sacrifices were *anticipatory*, of the death of Christ—not as iterating or repeating it (which idea alone the 31st article is held to condemn), but as a solemn pleading and offering of it before God, as Christ himself offers it in heaven. Hence the position of the celebrant in front of the altar, and the use of a sacrificial vestment, as the chasuble is held to be. (3) In the eucharist, there is a real presence of Christ, which, though spiritual, is *objective*, i.e., not dependent on the receiver, but as a result of consecration, and to a certain extent *local*. (The growth of this belief is marked by the change made in a recent edition of Keble's *Christian Year* of the words, "*not* in the hands," in a poem on the eucharist, to, "*as* in the hands.") Hence distinct acts of adoration, addressed, not, as is explained, to the elements, but to the divine presence, of which they are the vehicles and signs.

(*c*) On the ground of *expediency* also, it is contended: (1) That experience proves that the only way of attracting and gaining a hold on the vast uneducated masses of our towns and cities is by a worship addressed not merely to the ear, but to the eye. "Ritualism," says one of its defenders, "is the *object-lesson* of religion." Services conducted in grand and beautiful buildings—brilliantly lighted—with splendid vestments, touching music, costly decorations, and every outward token of reverence and solemnity, will impress the young and the poor as nothing else can do. Those churches in London where advanced ritual prevails are said to be thronged with worshipers—mainly of the lower classes, and in great proportion of men—when others are almost empty. (2) A further argument, under this head, is connected with the desire, which has grown up of late years among the High church party, for the restoration of the visible unity of Christendom, and specially the renewal of communion between the church of England and both the Eastern and the rest of the Western church; and with this view, it has become an avowed object to assimilate the Anglican service as much as possible to that of other Catholic churches.

It remains to notice briefly the effect of these innovations. It is a remarkable index of the change of popular feeling within the last twenty years, that such bold and startling changes, altering the whole character of the Anglican service, should, by a large number of people be not only tolerated, but approved. In 1859 the attempt of the rector of St. George's-in-the-east to introduce eucharistic vestments led to riots which convulsed the whole of east London. In the year 1867, in about twelve churches of the metropolis—and in several country towns and villages—a far more advanced ritual, with vestments, altar-lights, and other ceremonies, regularly attracted an eager throng, not of spectators only, but of worshipers. And the spread of the movement may be judged by the statement, which appears authorized by facts, that within a few months after the first report of the royal commissioners on ritual, the vestments were introduced in more than thirty churches. On the other hand, among the "Protestant" members of the church, and those of other denominations, the movement has provoked the loudest opposition. Most of the bishops have, directly or indirectly, expressed their disapprobation; the press, except two or three journals, which are its strenuous advocates, is almost unanimous in denouncing it; the more moderate members of the high church party discourage it; and active efforts have been made to arrest it by legislative interference. In the lower house of convocation, on the motion of the dean of Ely, a committee was appointed to consider the subject, which, after careful examination, reported, in June, 1866, that vestments and altar-lights, whether legal or not, should not be introduced without sanction of the bishop; that the censing of persons and things, elevation after consecration, wafer-bread, and presence of non-communicants (except in special cases), were to be discouraged. In deference to this opinion the censing of persons and things has been in some churches given up. Suits were instituted against several individuals—the rev. A. H. Mackonochie, incumbent of St. Albans, London; the rev. T. B. Simpson, in the diocese of Essex, and others. The points complained of in these are chiefly elevation and the mixed chalice. In the beginning of the year 1866 an opinion was obtained, at the instance of some of the bishops, from five eminent counsel, among whom were sir R. Palmer and sir Hugh (now lord) Cairns, against the legality of all ritualistic innovations (the main grounds of which opinion are given in the *objections* above stated). In reply to this, another opinion was obtained, by the council of the English church union, from nine leading counsel—some of whom have since been raised to the bench—all of whom advise in favor of the legality of vestments, all but two in favor of altar-lights, and all against incense; on the mixed chalice and wafer-bread they are nearly equally divided.

In the session of 1867 the earl of Shaftesbury introduced a bill—founded on the 58th canon of 1603—to limit ecclesiastical vestments to the ordinary surplice and hood, in favor of which more than 600 petitions were presented; while one against it, presented by lord Redesdale, was signed by more than 9,000 clergy and lay communicants. (An earlier memorial, to the archbishop of Canterbury, against any change in the existing law, was signed by more than 40,000 communicant members of the church.) This bill was withdrawn on the appointment by the government of a commission "to inquire into the rubrics, orders, and directions for regulating the course and conduct of public worship, etc., according to the use of the united church of England and Ireland." The commissioners included the archbishops of Canterbury and Armagh, and the bishops of London, St. Davids, Oxford, and Gloucester. They published a report to the effect that "it is expedient to restrain, in the public services of the church, all variations in respect of vesture from that which has long been the established usage of the said church; and that this may be best secured by providing aggrieved parishioners with an easy and effectual process for complaint and redress." The evidence appended to the report supplies much information as to the various practices prevailing, and the widely different views entertained. The general conclusions appear to be that vestments, and probably altar-lights and the mixed chalice, are legal; that an ornate ritual is useful among some classes, and might, with certain safeguards, be allowed; that absolute uniformity is impossible, but that the law might be obeyed a good deal more generally than it is; that the maintenance of the present law, with a wide and liberal interpretation, but limited as a maximum to the ritual of the 2d year of Edward VI., with some recognized ecclesiastical authority to restrain unauthorized variations, would be most for the welfare of the church. The report produced no restraint on the progress of ritualism, and in May, 1873, 60,000 persons of standing and influence presented an address to the two archbishops requesting them to adopt means for checking the growth of ritualistic practices. In April, 1874, a bill for this purpose was introduced in the house of lords by the archbishop of Canterbury, entitled the public worship regulation act. It was adopted by the government, but was opposed in the house of commons by Mr. Gladstone in a series of six resolutions, and notwithstanding a considerable amount of ecclesiastical agitation it became law in August. Its main provision is the appointment of a judge for the trial of ritualistic cases. A complaint against the use of vestments, ornaments, and rites and ceremonies, or the omission of such as are ordained in the book of common prayer, in the churches or burial-grounds of the church of England, may be presented to the bishop of the diocese by an archdeacon or churchwarden, or by three parishioners, members of the church, of full age, and a year's residence in the parish. In the event of the parties not submitting to the directions of the bishop, he shall forward the case for trial by the judge, from whose decision an appeal lies to the privy council.

RITUALISM (*ante*), in one of the many questions to which it gives rise—though perhaps not one of its recently characteristic aspects—is illustrated in the case of the rev.

G. C. Gorham, an English clergyman, whom the bishop of Exeter refused to "institute" because he held that "spiritual regeneration is not given in baptism—in particular that infants are not made therein members of Christ and children of God—contrary to the teaching of the church of England in her articles and liturgy, the office of confirmation, and the catechism." The arches court of Canterbury having sustained the bishop, an appeal was taken to the judicial committee of privy council. In the opinion of this court Mr. Gorham held that "baptism is a sacrament generally necessary to salvation; but that the grace of regeneration does not so necessarily accompany the act of baptism that regeneration invariably takes place in baptism; that baptism is an effectual sign of grace, by which God works in us, but only in such as worthily receive it; that infants, baptized and dying before actual sin, are certainly saved; but that in no case is regeneration in baptism unconditional." The court held that this view is not contrary to the teaching of the church of England as by law established, and does not afford legal ground for refusing institution. See GORHAM CONTROVERSY, *ante*.

RIVAS, ANGEL DE SAAVEDRA, Duke of, b. Spain, 1791; entered the army and fought through the Spanish war of independence. He participated in the revolution of 1820; was secretary of the cortes in 1821; and was forced to leave the country in 1823. He was minister of the interior in 1836, was again in exile 1837–43, and resided at Naples as ambassador 1843–48. He was afterward ambassador to Paris, and president of the council of state. He won a reputation as a poet by his *Ensayos Poeticos* in 1813, and has since published epics, dramas, and histories. He is the chief of the national school of Spanish literature.

RIVE-DE-GIER, a flourishing manufacturing t. of France, in the dep. of Loire, stands on the Gier, in the middle of the best coal-field in France, 13 m. n.e. of St. Etienne by railway. There is water-communication with the Rhone by means of the canal-de-Givors, which extends from this town to Givors, on the Rhone. South of the town is the immense and well-built basin of Couson, containing 1,500,000 cubic meters of water for the supply of the canal. Rive-de-Gier was formerly a mere stronghold, surrounded by high walls, and defended by a strong castle; and in 1815 the number of its inhabitants was under 4,000. In 1876 it contained 14,518 inhabitants. Around the town there are about 50 coal-mines in operation; and the principal manufacturing establishments are silk-mills, important glass-works, factories for steam-engines and other machinery, steel factories and foundries.

RIVER. Rivers are the result of the natural tendency of water, as of all other bodies, to obey the law of gravitation by moving downward to the lowest position it can reach. The supply of water for the formation of rivers, though apparently derived from various sources, as from rain-clouds, springs, lakes, or from the melting of snow, is really due only to atmospheric precipitation; for springs (q.v.) are merely collections of rain-water; lakes are collections of rain or spring water in natural hollows, and snow is merely rain in a state of congelation. The rills issuing from springs and from surface-drainage unite during their downward course with other streams, forming rivulets; these, after a further course, unite to form rivers, which receiving fresh accessions in their course from tributaries (subordinate rivers or rivulets) and their feeders (the tributaries of tributaries), sweep onward through ravines, and over precipices, or crawl with almost imperceptible motion across wide, flat plains, till they reach their lowest level in ocean, sea, or lake. The path of a river is called its course; the hollow channel along which it flows, its bed; and the tract of country from which it and its subordinates draw their supplies of water, its basin, or drainage-area. The basin of a river is bounded by an elevated ridge, part of which is generally mountainous, the crest forming the water-shed; and the size of the basin, and the altitude of its water-shed, determine, *cæteris paribus*, the volume of the river. See RAIN. The greater or less degree of uniformity in the volume of a river in the course of a year, is one of its chief physical features, and depends very much on the mode in which its supply of water is obtained. In temperate regions, where the mountains do not reach the limit of perpetual snow, the rivers depend for their increase wholly on the rains, which, occurring frequently, and at no fixed periods, and discharging only comparatively small quantities of water at a time, preserve a moderate degree of uniformity in the volume of the rivers—a uniformity which is aided by the circumstance, that in these zones, only about one-third of the rain-fall finds its way directly over the surface to the rivers; the remaining two-thirds sinking into the ground, and finding its way to spring-reservoirs, or gradually oozing through at a lower level in little rills which continue to flow till the saturated soil becomes drained of its surplus moisture, a process which continues for weeks, and helps greatly to maintain the volume of the river till the next rain-fall. This process, it is evident, is only possible where the temperature is mild, the climate moist, evaporation small, and the soil sufficiently porous; and under these circumstances, great fluctuations can only occur from long-continued and excessive rains or droughts. In the hotter tracts of the temperate zones, where little rain falls in summer, we occasionally find small rivers and mountain torrents becoming completely exhausted; such is often the case in Spain, Italy, Greece, and with the Orange, one of the largest rivers of s. Africa

In tropical and semi-tropical countries, on the other hand, the year is divisible into one dry and one wet season (see RAIN); and in consequence, the rivers have also a periodicity of rise and fall, the former taking place first near the source, and, on account of the great length of course of some of the tropical rivers, and the excessive evaporation to which they are subjected (which has necessarily most effect where the current is slow), not making itself felt in the lower part of their course till a considerable time afterward. Thus, the rise of the Nile occurs in Abyssinia in April, and is not observed at Cairo till about midsummer. The fluctuations of this river were a subject of perpetual wonderment to the ancient civilized world, and were of course attributed to superhuman agency; but modern travel and investigation have not only laid bare the reason of this phenomenon, but discovered other instances of it, before which this one shrinks into insignificance. The maximum rise of the Nile, which is about 40 ft., floods 2,100 sq.m. of ground; while that of the Orinoco, in Guiana, which is from 30 to 36 ft., lays 45,000 sq. m. of savannah under water; the Brahmaputra at flood covers the whole of upper Assam to a depth of 10 ft., and the mighty Amazon converts a great portion of its 500,000 sq. m. of silvas into one extensive lake. But the fluctuations in the rise of the flood-waters are surpassed by some of the comparatively small rivers of Australia, one of which, the Hawkesbury, has been known to rise 100 ft. above its usual level. This, however, is owing to the river-beds being hemmed in by lofty abrupt cliffs, which resist the free passage of a swollen stream.

The increase from the melting of snow in summer most frequently occurs during the rainy season, so that it is somewhat difficult to determine, with anything like accuracy, the share of each in producing the floods; but in some rivers, as the Ganges and Brahmaputra, the increase from this cause is distinctly observable, as it occurs some time after the rains have commenced, while in the case of the Indus it is the principal source of flood. When the increase from melted snow does not occur during the rainy season, we have the phenomenon of flooding occurring twice a year, as in the case of the Tigris, Euphrates, Mississippi, and others; but in most of these cases the grand flood is that due to the melting of the snow or ice about the source. In illustration of the enormous variation in the volume of rivers subject to periodical rise and fall, we shall give a few instances in which the minimum and maximum delivery per second have been ascertained:

DELIVERY IN CUBIC FEET PER SECOND.

	Minimum.	Maximum.	Average for a year.
Nile (at Assouan)........	24,000	362,000	101,000
Ganges..................	36,000	494,000	141,000
Irrawady................	84,000 (?)	1,000,000 (?)	350,000
Brahmaputra...........	146,000	1,800,000 (?)	520,000

The advantages of this periodical flooding in bringing down abundance of rich fertile silt—the Nile bringing down, it is said, no less than 140 millions of tons, and the Irrawady 110 millions of tons annually—are too well known to need exposition here. Islands are thus frequently formed, especially at a river's mouth (see DELTA). Permanent and capacious lakes in a river's course have a modifying effect, owing to their acting as reservoirs, as is seen in the St. Lawrence; while the Red river (N.) and others in the same tract, inundate the districts surrounding their banks for miles. In tropical countries, owing to the powerful action of the sun, all rivers whose source is in the regions of perpetual snow, experience a daily augmentation of their volume; while some in Peru and Chili, being fed only by snow-water, are dried up regularly during the night.

The course of a river is necessarily the line of lowest level from its starting-point, and as most rivers have their sources high up a mountain slope, the velocity of their current is much greater at the commencement. The courses of rivers seem to be partially regulated by geological conditions of the country, as in the case of the San Francisco of Brazil, which forms with the most perfect accuracy the boundary-line between the granitic and the tertiary and alluvial formations in that country; and many instances are known of rivers changing their course from the action of earthquakes, as well as from the silting up of the old bed. The inclination of a river's course is also connected with the geological character of the country; in primary and transition formations, the streams are bold and rapid, with deep channels, frequent waterfalls and rapids, and pure waters, while secondary and alluvial districts present slow and powerful currents, sloping banks, winding courses, and tinted waters; the incline of a river is, however, in general very gentle —the average inclination of the Amazon throughout its whole course being estimated at little more than 6 in. per m., that of the lower Nile less than 7 in., and of the lower Ganges about 4 in. per mile. The average slope of the Mississippi throughout its whole length is more than 17 in. per m., while the Rhone is, with the exception of some much smaller rivers and torrents, the most rapid river in the world, its fall from Geneva to Lyons being 80 in. per m., and 32 in. from Lyons to its mouth.

The velocity of rivers does not depend wholly on their slope; much is owing to their depth and volume (the latter being fully proved by the fact that the beds of many rivers remain unaltered in size and slope after their streams have received considerable accessions, owing to the greater rapidity with which the water runs off); while bends in the course, jutting peaks of rock or other obstacles, whether at the sides or bottom, and even the friction of the aqueous particles, which, though slight, is productive of perceptible effect, are retarding agencies. In consequence, the water of a river flows with different velocities at different parts of its bed; it moves slower at the bottom than at the surface, and at the sides than the middle. The line of quickest velocity is a line drawn along the center of the current, and in cases where this line is free from sudden bends or sharp turns, it also represents the deepest part of the channel. The average velocity of a river may be estimated approximately by finding the surface-velocity in the center of the current by means of a float which swims just below the surface, and taking four-fifths of this quantity as a mean. If the mean velocity in feet per minute be multiplied by the area of the transverse section of the stream in sq. feet, the product is the amount of water discharged in cubic feet per minute. According to sir Charles Lyell, a velocity of 40 ft. per minute will sweep along coarse sand; one of 60 ft. fine gravel; one of 120 ft. rounded pebbles; one of 180 ft. (a little more than 2 m. per hour), angular stones the size of an egg. The rate of its progression, and a general description of the erosive action of rivers, will be found under WATERFALLS. "Rivers are the irrigators of the earth's surface, adding alike to the beauty of the landscape and the fertility of the soil; they carry off impurities and every sort of waste débris; and when of sufficient volume, they form the most available of all channels of communication with the interior of continents . . . . They have ever been things of vitality and beauty to the poet, silent monitors to the moralist, and agents of comfort and civilization to all mankind." By far the greater portion of them find their way to the ocean, either directly or by means of semi-lacustrine seas; but others, as the Volga, Sir-Daria (Jaxartes), Amu-Daria (Oxus), and Kur (Araxes), pour their waters into inland seas; while many in the interior of Asia and Africa—as the Murghab in Turkestan, and the Gir in the s. of Morocco—"lose themselves in the sands," partly, doubtless, owing to the porous nature of their bed, but much more to the excessive evaporation which goes on in those regions. The following are a few of the chief rivers in each continent, with the lengths of their courses in English statute m., and their drainage areas in English geographical sq.m. (the Thames is given as a standard of comparison):

	Length.	Drainage Area.		Length.	Drainage Area.
EUROPE.					
Thames	220	5,000	Dwina	1,041	106,000
Vistula	598	57,000	Don	1,104	168,000
Loire	598	84,000	Dnieper	1,243	170,000
Rhine	690	65,000	Danube	1,722	234,000
Elbe	787	48,000	Volga	2,768	397,000
ASIA.					
Euphrates	1,716	196,000	Hoang-ho	2,624	537,000
Ganges	1,983	432,000*	Obi	2,670	925,000
Indus	2,256	312,000	Amur	2,739	583,000
Maykan or Cambodia	2,417	216,000†	Lena	2,762	594,000
Thaluain or Martaban	2,152	331,000	Yenesei	3,322	785,000
Irrawady	2,582		Yang-tze-kiang	3,314	548,000
AFRICA.					
Zambesi	1,400	432,000	Nile	2,578	520,000
Congo or Livingstone	2,400 (?)	(?)			
AMERICA.					
St. Lawrence	2,072	298,000	Mackenzie	2.440	442,000
Rio Bravo del Norte	2.188	180,000	Amazon	3,545	1,512,000
La Plata	2,210	886,000	Mississippi	3,716	982,000

In law, when a river not navigable forms the boundary of property, it is taken to belong in equal halves to the proprietors on opposite sides; and when both sides belong to one owner, then the whole of the bed belongs to him. In the common case where it is a boundary, an imaginary line called the *medium filum*, runs down the middle, and all the bed of the river on one side belongs to the proprietor of the land on that side. This rule refers to the soil under the water, which is as absolutely the property of the riparian owner as the banks of the river themselves. As regards the water, it is true that the riparian owner on his side of the middle line has not the absolute property of the water itself, but he can use it to a limited extent—as, for example, to water his cattle, to supply the wants of his house. etc. The right of abstracting quantities of water is limited to this extent, that if, by taking more than the usual quantity required for necessary purposes, the rights of other riparian owners further down are materially injured, then the latter can bring an action to recover damages for such injury. Thus, if a riparian owner or his tenant had a mill on the river which had existed thirty or forty years, and a riparian owner further up has materially diminished the volume of water, an action of damages will be competent. So one owner cannot alter the bed or embank the river so as to injure other owners. With regard to fishing, each riparian owner has a right to fish in his half of the river, and to catch all he can find there, subject to the restrictions of the fishery laws. (Paterson's *Fishery Laws of the United Kingdom.*) In Scotland, the riparian owner, unless he has a grant from the crown, cannot meddle with salmon so far as net-fishing is concerned, though he may fish for salmon with the rod. It follows that a riparian owner, when fishing with the net or rod, cannot go beyond his own half of the stream; and if he cast his line beyond the mid-stream, he would be liable to an action of trespass. But it is usual for opposite riparian owners to allow each other to fish the whole stream, for this is more convenient to both parties. The restrictions as to the times of fishing and the size of nets are stated under FISHERY. Where a river is navigable, the soil belongs to the crown, and the public have *primâ facie* a right to fish in it, though individuals may prove a title to a several or exclusive fishery there, but the burden of proof lies on such individuals. As between navigation and fishing, the right of navigation is paramount, and the fisherman must yield to the navigator.

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* Including basin of Brahmaputra.

† Including basin of Menam.

The *poisoning of rivers* has begun of late years to cause serious concern, in consequence of the extension of manufactures, many of which are situated on the banks of streams, and use such streams as a drain or sewer. No person has a right so to poison or pollute a stream, and if he do so, any of the persons whose lands abut on the stream lower down may bring an action to recover damages. But if these tolerate the nuisance without complaint for twenty, or, at all events, forty years, they are forever afterward precluded from complaining. Hence, in most cases, the manufacturers who pollute streams must be able to prove that they have been in the practice of doing so without challenge for twenty, or at most forty years. As, therefore, the law was defective in guarding salmon-rivers from this danger, the English salmon fishery act enacted that all persons who poison streams without a legal right of this kind shall be liable to fine; and, moreover, even when they have the legal right, they must prove that they have used all reasonable means to counteract the ill effect of their refuse. Whoever unlawfully or maliciously puts lime or other noxious material in a pond or water with intent to destroy the fish therein, commits a misdemeanor, and may be sentenced to seven years' penal servitude. In Ireland and Scotland, the law does not materially differ from that of England as to poisoning rivers and streams; and it is an offense to put lime into streams to kill fish.—Paterson's *Fishery Laws of the United Kingdom.* Besides the offenses declared by the salmon acts of the United Kingdom, there are also similar penalties for poisoning waters, imposed by the water-works clauses act, 10 Vict. c. 17, s. 61; the public health act, the nuisances removal and other sanitary acts. See also the rivers pollution prevention act, 1876.

RIVER-CRAB, *Thelphusa*, a genus of crabs inhabiting fresh water, and having the carapace quadrilateral, the antennæ very short. One species (*T. depressa*), the *grancio* of the Italians, is very common in the south of Europe, and is often figured on ancient Greek medals. It was in ancient times as it still is, an esteemed article of food. It is much used in Italy during Lent. It inhabits muddy lakes and slow rivers. In some it absolutely swarms. It can be kept alive in a damp place for a long time. It is often brought to market tied on strings, at such distances as to prevent fighting and mutilation. This crab spends the winter deeply imbedded in the mud.—Other species are common in warm countries. *T. cunicularis* is very abundant on the ghauts of the Deccan, in India, burrowing in the ground, and running about among the long grass. It "runs with considerable swiftness, even when encumbered with a bundle of food as big as itself; this food is grass, or the stalks of rice; and it is amusing to see the crabs sitting, as it were, upright, to cut their hay with their sharp pincers, and then waddling off with their sheaf to their holes, as quickly as their side-long pace will carry them."

RIVER-TERRACES occur in some valleys, and exhibit the action of the river in scooping out its bed when it flowed at a higher level than it does now. The terrace consists of a more or less steep cliff, a few feet, or it may be yards high, with a flat terrace on a level with the top of it. The cliff corresponds to the present bank, and the terrace to the alluvial plain through which the river runs. The cliffs and terraces are repeated several times in some river-basins, and they frequently correspond on the two sides of the valley. They follow the course of the river, sloping downward, with an inclination similar to the descent of the stream. They differ in this respect from the parallel roads formed by standing water. See GLENROY.

RIVES, JOHN C., 1796–1864; b. Ky.; self-educated, cashier of a bank in Illinois, clerk in the office of the 3d auditor in Washington, 1824. Soon after the election of pres. Jackson, associated with Francis P. Blair, he assumed the management of the *Congressional Globe*, exerting a wide political influence. He was distinguished for patriotism and practical philanthropy.

RIVES, WILLIAM CABELL, 1793–1868; b. Va.; educated at Hampden-Sidney and William and Mary colleges, and admitted to the bar. He was a member of the state constitutional convention in 1816, of the state legislature 1817–19 and 1822, and of congress 1823–27. He was minister to France 1829–32, when he was elected to the U. S. senate, from which he resigned in 1834. He was re-elected in 1835, and remained in the senate till 1845. He was again minister to France 1849–53, a member of the peace conference at Washington in 1861, and afterward of the confederate provisional congress. He published *Life and Times of James Madison.*

RIVET, a metal pin for connecting two plates of metal or other material together. The rivet is put through holes in both plates, and the projecting ends are then beaten down so as to represent the head of a nail on each side, and thus hold the plates in close contact. Rivets are of most essential importance in boiler and tank making, and in building iron ships. They are often put through the holes and beaten down while red-hot, in order that the contraction of the rivet as it cools, may produce more intimate contact of the plates. The principle of the *riveting-machine* is simply the bringing a powerful lever to bear upon the head of the rivet, so that the smith can hammer upon the other and softened end without displacing it.

RIVIERA (sea-shore, coast), a term applied to the narrow strip of coast-land bordering the gulf of Genoa from Nice to Spezzia. Between Nice and Genoa it is called the Riviera di Ponente, or western coast, and the part from Genoa to Spezzia, the Riviera di Levante, or eastern coast. It abounds in the most striking scenery, uniting beauty with grandeur. The modern road that traverses it was a work of formidable difficulty; it was begun under French rule, and finished by the Sardinian government after the fall of Napoleon. The old road, which was dangerous and almost impracticable, was known as the Corniche road and this name is often applied to the modern one. A railroad throughout the whole length of the Riviera has recently been completed.

RIVINGTON, JAMES, about 1724-1802; b. London; came to Philadelphia 1760; in 1761, to New York, where he established himself in the book trade, and in 1773 commenced the publication of the *New York Gazetteer*. In 1775 he espoused the royal cause; and capt. Isaac Sears, of the patriot army, "with a troop of horse," made a raid on his office, destroyed his press, and run his types into bullets. He made a journey to England, returned while the British ruled New York, and, provided with a new press, commenced business again as king's printer. His paper came out at first as *Rivington's New York Loyal Gazette*, afterward as *The Royal Gazette*. In 1781 he informed against the British, and remained in New York after the evacuation, issuing his paper as *Rivington's New York Gazette and Universal Advertiser*. The last number appeared in 1783.

RI'VOLI, a t. of northern Italy, on the right bank of the river Dora, 8 m. w. of the city of Turin. Pop. 5,600 —Rivoli must not be confounded with the village of the same name in the province of Verona, near which took place in 1797 one of Napoleon's most decisive victories over the Austrians.

RIYAD, or RIAD, a city in central Arabia, capital of the Wahabite kingdom and the sultanate of Nedjed, province of Aared; pop. 40,000. It is built on an extensive open plain in the midst of a well-cultivated region shaded by palm groves. In the n.e. are the official quarters, the royal palace, and the residences of the nobility; in the s.w. are the homes of the Wahabites. In the center of the city is a large square containing the market-place and the great mosque, capable of holding 2,000 persons. The city contains 30 smaller mosques.—It is a resting-place for pilgrims on the way from Persia to Mecca and Medina. It has been the capital of the Wahabites since the overthrow of Derayeh by Ibrahim Pasha. All citizens are obliged to conform to Wahabite rules.

RI'ZAH, a t. of Asiatic Turkey, in the pashalic of Trebizond, on the coast of the Black sea, 40 m. e. from Trebizond, with considerable trade, and manufactures of fine hempen fabrics. Pop. 30,000.

RIZZIO, DAVID, an Italian of considerable ability and accomplishments, who, in the reign of Mary Stuart, queen of Scots, came to Edinburgh in the train of the ambassador from Savoy. His first employment at court was as a musician; but his skill and fidelity led Mary to advance him to the post of her French secretary about the time of her marriage with Darnley; and in this situation he was believed to possess considerable influence over the queen. His advancement was distasteful to the nobles in general, but more especially to the party of the reformers, who suspected him of intriguing with the papal court. He became obnoxious on other grounds to Darnley and his father, the earl of Lennox. The former, who had for a time been on the most friendly footing with him, was easily led to believe not merely that he was the real obstacle to his favorite design of having the crown settled on him and his heirs, but also that he had supplanted him in the affections of the queen. In this belief he entered into a compact with the leaders of the Protestant party—including Murray, Ruthven, Morton—to assassinate Rizzio, and slay even in the queen's palace and presence whoever opposed them. Darnley formally bound himself to prevent the attainder of the conspirators, and procure their pardon, and to support and advance the Protestant faith, while the conspirators in return obliged themselves to procure the wished-for settlement of the crown in his favor. Accordingly, on Mar. 9, 1566, when Mary, then seven months with child, was sitting at supper in a small cabinet adjoining her bedroom, at Holyrood, attended by the countess of Argyle, the commendator of Holyrood, Beaton, master of the household, Arthur Erskine, captain of the guard, and Rizzio, the king led the conspirators up a secret stair, while the earl of Morton, with a troop of soldiers, seized the gates of the palace. Led by the king, the conspirators burst into the cabinet, overturned the table, and threw themselves on Rizzio, who sprang for protection behind the queen. Ruthven drew his dagger; Ker of Fawdonside, it is said, held a pistol to the queen's breast; while George Douglas, natural son to the earl of Angus, snatching the king's dagger, stabbed Rizzio over the queen's shoulder, and dragging him from the cabinet, dispatched him in a pool of blood in the adjoining apartment, with fifty-six wounds. This murder was the first of the series of tragic events in which Mary queen of Scots was involved. John Knox, in his *History of the Reformation*, characterizes it as a "a just act, and most worthy of all praise."

ROACH, *Leuciscus rutilus* (see LEUCISCUS), a fish of the family *cyprinidæ*, very plentiful in many of the lakes, ponds, and slow-running rivers of England and of the s. of Scotland. It is also found on the continent of Europe. It is seldom more than a pound in weight, although it has been known to reach five pounds. The upper parts are dusky-green with blue reflections, passing into silvery-white on the belly, the fins more or less red. The roach is gregarious, and the shoals are often large. It is partially migratory, ascending rivers from lakes—as from Loch Lomond—to spawn. It is not much esteemed for the table. It is generally caught with bait, but sometimes with a small fly.

ROAD, in the law of Scotland, is used in the same sense as highway (q.v.) in England. Road trustees are persons who are authorized by act of parliament to make and manage a particular road, and levy tolls from the public to pay the expense. In England road trustees necessarily mean the trustees of a turnpike road, on which alone a toll is leviable, the ordinary highways being repairable by the parish, and under the management of the highway surveyor appointed by the parish. In Scotland, by the earlier statutes, public roads were placed under the general management of the commissioners of supply and justices of the peace; but later local statutes authorized trustees to apportion statute labor amongst the local inhabitants for the repair of highways not turnpike. At length general road acts were passed, 1 and 2 Will. IV. c. 43 to 25 and 26 Vict. c. 105, and the local acts now incorporate the last general act. Practically the roads of each county are under a separate statute, which prescribes the modes of management of the roads.

ROAD, LAW OF THE. See RULE OF THE ROAD.

ROADS AND ROAD-MAKING. Roads form a primary element in the material advancement of a nation, being essential to the development of the natural resources of the country. Canals and railways have no doubt, in modern times, superseded to some extent the common highways; still these retain their importance were it only as essential auxiliaries.

The Romans were great constructers of roads, and regarded them as of vital importance for conquest and the maintenance of their empire. They are said to have learned the art from the Carthaginians. Except where some natural barrier made it impossible, the Roman roads were almost invariably in a straight line; probably because the chief means of transport then in use were beasts of burden, and not wheeled vehicles, which made the preservation of the level of less consequence. The substantial character of the Roman roads is well demonstrated by the fact that they have in some instances borne the traffic of 2,000 years without material injury. The plan of construction was pretty uniform, being that described in the article on the APPIAN WAY, one of the earliest and most famous of them. They varied in breadth from 15 to 8 ft., and had often raised footpaths at the sides and blocks of stones at intervals to enable travelers to mount on horseback.

The roads made by the Romans in Great Britain gradually fell into decay, and the attempts that were now and then made to repair them were insufficient to prevent England falling into a worse state with respect to its highways than most other European countries. In 1285 one of the earliest laws on the subject of roads was passed. It directed that all trees and shrubs be cut down to the distance of 200 ft. on either side of roads between market-towns, to prevent the concealment of robbers in them. The first toll for the repair of roads was levied by the authority of Edward III. in 1346 on roads which now form part of the streets of London. In 1555 an act was passed requiring each parish to elect two surveyors of highways to keep them in repair by compulsory labor; at a later period, in place of the compulsory labor the "statute labor-tax" was substituted. But long after this, the roads even in the neighborhood of London were wretchedly bad, and in the other parts of the country they were still worse. For the most part, indeed, they were mere horse-tracks; the chief advantage in following them being that they led along the higher grounds and so avoided bogs. These trackways were usually impassable in winter; being narrow, and in many places so deep and miry as to be liker ditches than roads. So late as 1736 the roads in the neighborhood of London were so bad that in wet weather a carriage could not be driven from Kensington to St. James's palace in less than two hours, and sometimes stuck in the mud altogether. Much curious information on the state of the roads and means of conveyance in England during the long period which elapsed from the decay of the Roman roads to the middle of the last century will be found in vol. i. of Smiles's *Lives of Engineers*.

In laying out a new line of road the skill and ingenuity of the engineer are taxed to make the gradients easy with as little expense as possible in excavating and embanking (see EMBANKMENT), and to do this without deviating much from the direct course between the fixed points through which the road must pass. In order to do this an accurate survey of the tract, including the relative levels of its different parts and the nature of the strata, is a necessary preliminary. The formation of an extended line of road often involves the construction of extensive bridges, viaducts, and the like, which require the greatest engineering skill.

The importance of easy gradients or inclinations in roads is well understood in a general way; but it gives a more precise idea of it to state that while, for example, the force requisite to draw a wagon weighing 6 tons along a level macadamized road is 264 lbs., on a road with an ascent of 1 in 70 the force required is 456 lbs., i. e., $\frac{1}{70}$ part of 6 tons over and above 264 lbs. The greatest declivity which can be given to a road, so that horses may move down it with safety in a fast trot, varies according to its nature; for paved roads, 1 in 63—for those which are macadamized, 1 in 35—and for those laid with gravel, 1 in 15, have been considered the limit.

What is the best transverse form for a road is a much debated question among engineers. All agree that it should be higher in the middle than at the sides, but some think it should be much higher than others. As a road can be better kept clear of water by a slight inclination in the direction of its length than by any form which can be given to its cross-section it seems preferable that it should be as nearly flat as possible, because every part of its breadth will then be equally available for traffic; whereas it is almost necessary to keep on the center of a highly convex road, and consequently wear deep furrows there, by confining the wheels and horses to pretty much the same track. An approved form of road has a slope of 1 in 30, with a few feet in the center on a flat curve.

Different opinions are also held as to whether the bed upon which the road is to be formed should be flat or rounded; those who prefer it flat considering that there should be a greater depth of material at the center than at the sides, while others think that the depth should be uniform.

As respects the construction of the road itself, the first point to consider is the foundation. The majority of roads have no artificial foundation. In such cases the surface on which the road-material is to be laid is generally made as solid as possible by means of efficient drainage, and by rolling and beating wherever there are embankments formed. It is the question whether or not a road should have a foundation of rough pavement below the broken stone covering, which is the essential point of difference between the two great rival systems of Telford and Macadam. Telford considered it of great importance that there should be such a foundation. He made it of stones varying in depth from 9 in. at the center to 3 in. at the sides of the road, these being set with their broadest edge downward, and no stone being more than 4 in. broad upon the upper edge; upon these were placed a coating of broken stones not exceeding 6 in. in thickness. The Glasgow and Carlisle and the Holyhead roads are excellent examples of the enduring character of those made on Telford's plan.

In our biographical notice of Macadam (q.v.) will be found a reference to his method of road-making. Suffice it here to say that he preferred a yielding and soft foundation to one which was rigid and unyielding, so that even on boggy ground, if it were but firm enough to allow of a man walking over it, he considered an artificial bottoming quite unnecessary. His roads were formed entirely of angular pieces of stones, of such a size as to pass freely through a ring 2½ in. in diameter. This plan has now fewer advocates than Telford's, or than the one subsequently proposed by Mr. Thomas Hughes, where a concrete of gravel and lime is employed for the foundation of the road. But experience has shown that Macadam's plan of employing angular pieces of stone is superior to every other as a mere covering for roads, whether they have an artificial foundation or not. So popular at one time was the system of macadamizing, that expensively paved streets, such as that between Edinburgh and Leith, were torn up to be reformed on the new plan. Dublin has been instanced as an example of the failure of Macadam's plan for the streets of a populous city. There the macadamized streets are in winter constantly covered with mud, and in summer profuse watering is required to keep them from being overwhelmed with dust. It is curious, however, that the French road-engineers have, in recent years, come to the conclusion that a covering of broken stone alone is sufficient on the most frequented roads and under all but the very heaviest traffic.

With regard to the kind of stone suitable for covering roads, granite and the different kinds of greenstone and basalt, ordinarily called whinstones, are the only kinds admissible. Sandstone is too easily crushed, limestone is objectionable from its slight solubility in water. The stone employed should be tough as well as hard. Flint is hard enough, but it is brittle, and easily crushed to powder. The object is to get it to bind into a firm mass, and not to roll about, after it has been laid down for some time.

Little need be said about the drainage of roads, notwithstanding its great importance, because it will be apparent from what has been said, that it is in great part secured by the plan on which a road is made. What further drainage a road requires, can, in many situations, be effected by ditches on either side. Where this is not possible, as in the case of portions situated in cuttings more or less deep, proper drains require to be constructed. In such circumstances a drain is either made down the center, with branch drains from the sides running into it; or drains are formed along the sides, with gratings at proper intervals to take in the surface-water. If the ground beneath the road is composed of clay or of any kind of wet soil, under drainage must be resorted to; and of course, wherever there are footpaths, small drains require to be placed under them, if there is no other means of carrying off the water from the channel between them and the road.

ROADS AND ROAD MAKING (*ante*). The Telford differs from the Macadam road in having beneath the broken stone, which is but 6 or 7 in. in depth, a pavement of stone blocks, 6 or 7 in. high and 4 or 5 wide. Sometimes a layer of rubble stone is laid as a foundation for these courses. Both the Macadam and Telford pavements need frequent superficial repairs in heavily traveled streets to prevent the forming of ruts. For ordinary use the Telford seems unsurpassed. The Belgian form of stone pavement is much improved by having the blocks as much as 10 in. deep, and some inches wider in their greatest direction, that at right angles to the street line, and by setting them on a concrete foundation. Their lines, however, are best set obliquely to the line of the street. Wooden pavements are liable to crushing of the fiber and to decay, even though creosoted, and in the end are more expensive than good stone or asphalt. They are now disused. The stone pavement possesses the advantage of greater durability than the asphalt, and is less slippery after rain. On the other hand it is far noisier, and the joints and inevitable depressions hold dust, water, and refuse; and hence for both reasons is open to objection on hygienic grounds. The asphalt material is obtained from the natural asphalt rock of Switzerland or by refining bitumen. This form of pavement has been undeservedly brought into disrepute by cheap imitations. For an ordinary carriage road the asphalt is excellent, but is scarcely fitted for the heaviest business travel, or for sharp ascent.

ROANE, a co. in e. Tennessee drained by the Clinch, Holston, and Tennessee rivers, crossed by the Cincinnati Southern railroad; about 550 sq.m.; pop. '80, 15,237—15,089 of American birth. The surface is hilly, and heavily timbered. The soil is moderately fertile. The principal productions are corn, oats, and cattle. Iron and coal are found. Co. seat, Kingston.

ROANE, a w. co. of W. Va., drained by the Pocotaligo river which rises here, and by branches of the Little Kanawha and De Kalb rivers; 450 sq.m.; pop. '80, 12,184. The surface is hilly and in some parts mountainous, and the northern part is covered with large forests, in which the sugar maple abounds; the soil is fertile. The chief productions are flax, tobacco, grain, hay, wool, and sorghum molasses. Sheep and swine are raised. It contains iron ore and coal. Co. seat, Spencer.

ROANNE, a thriving t. of France in the department of Loire, and, after St. Etienne, the most important town in the department for industry and commerce, stands on the left bank of the Loire, which is here navigable, 52 m. by railway n.w. of Lyon. Its streets are wide, and its houses handsome. The chief structures are the bridge over the Loire, the public library, and the college buildings. There are important manufactures of muslins, calicos, and woolen and other fabrics. Ship-building is carried on at the several dockyards. Roanne is also a most important entrepôt for commerce between the n. and s. of France. Pop. '76, 21,472. Around and within the town are to be found numerous traces of the ancient rule and civilization of the Romans.

ROANOKE,' a river of Virginia and North Carolina formed by the union at Clarkesville, Virginia, of the Dan and Staunton rivers, which rise in the Alleghanies, flows s.e. through the north-eastern portion of North Carolina, and empties into Albemarle sound. It is navigable for large vessels to Weldon, head of tide-water, 150 m.; its length is 260 miles. In 1861 Albemarle island, at its mouth, and Plymouth, were taken by the Federal gunboats.

ROANOKE, a co. in s. Virginia, drained by Staunton river and Craig's creek, traversed by the Atlantic, Mississippi, and Ohio railroad: about 300 sq.m.; pop. '80, 13,105—4,832 colored. The surface is level except in the s.e., which is intersected by the Blue Ridge. The soil is fertile. The principal productions are corn, wheat, oats, and live stock. Co. seat, Salem.

ROARING, a disease of the air-passages of the horse, is characterized by a grating, roaring noise, most noticeable during inspiration, and when the animal is galloped in heavy ground. It usually depends upon wasting of some of the muscles of the larynx: is apt to result from frequent attacks of cold, from strangles, inflammation of the neck-vein, or from tight reining. It constitutes unsoundness, unfits the animal for the satisfactory performance of fast work, is apt gradually to become worse, when a sharper whistling noise is produced, and is seldom curable. In recent cases a dose of physic should be given, a smart blister applied to the throat, or a seton inserted. As in broken-winded subjects the breathing is much less distressed when the horse is fed and watered several hours before being required to exert himself. He should have a liberal supply of good oats, but only a limited allowance of hay, which should be given damped. In bad cases, tracheotomy may be performed, and a pipe inserted in the windpipe, with which we have known heavy draught-horses work regularly for years.

ROASTING. All the apparently numerous forms of cookery may be reduced to two, viz., roasting and boiling (q.v.). In this general sense, roasting may be held to include broiling, baking, and all other processes which consist essentially in the exposure of food to the action of heat without the presence of any fluid excepting its own natural juices. Chemistry and experience alike teach that the first application of heat in roasting should be powerful and rapid, so as to form an external wall, by hardening the skin, and coagulating the superficial albuminous juices, and thus retain the deep-seated juices as much as possible within the meat. This external crust is usually formed in about 15 minutes, after which the meat should be removed to a greater distance from the fire, and allowed to cook slowly. The evaporation of the internal juices may be further restrained by the free and early application of flour—a process known as dredging. The loss of weight in roasting is greater than that in boiling; but it is mainly due to the melting out of fat and the evaporation of water, while the nutritive matter remains in an easily digestible form in the interior. Rules for calculating the time a joint of given weight requires for roasting, are given in all the ordinary cookery-books. Unless the roasting is continued long enough, those parts which are nearest the center do not become hot enough to allow the albuminous matters to coagulate, and hence they appear red, juicy, and *underdone*, as it is commonly called. The exact nature of the chemical changes which occasion the peculiarly agreeable odor of roasted meat is still unknown.

ROB, the Spanish name of a conserve of fruits. It is derived from the Arabic *roob*, signifying the juice of fruit, boiled to a sufficiently thick consistency to keep, and is supposed to have been taken from its similarity to the saccharine pulp of the locust-pods, called *al-garoba* by the Moors. The juices of strawberries, raspberries, gooseberries, currants, etc., are boiled with sugar until they form *robs*, and are in that state used for flavoring drinks, etc.

ROBBERY is larceny from the person, preceded by violence or the fear of violence. By the present statutory law of England and Ireland, 24 and 25 Vict. c. 96, whoever robs a person is guilty of felony, and liable to penal servitude, not exceeding 14 years, and not less than 3 years; or to imprisonment not exceeding 2 years, with or without hard labor. If, on the trial for robbery, it appear to the jury that the party charged did not commit the crime of robbery, but committed an assault with intent to rob, the party shall not be acquitted, but shall be found guilty of the assault with intent to rob. The punishment of an assault with intent to rob is penal servitude for 3 years, or imprisonment not exceeding 2 years. To constitute simple robbery, there must be what is called asportation, or a seizure of the goods. Thus, where the thief, in pulling a purse out of a pocket, could not disentangle it from the keys in the pocket, and so the purse never left the pocket, it was held not robbery; but where a thief detached a lady's earring, which became lost in the curls of her hair, it was held to be robbery. In the law of Scotland robbery also means the violent or forcible taking away of property from the person, while stouthrieff means the same offense in or near a dwelling-house.

ROBBERY (*ante*) is larceny from the person accompanied with violence or putting in fear. The thing taken must be of some value, otherwise the violence or putting in fear would be only an assault. The property need not be taken directly from the person or actual manual possession of the owner; it is sufficient if it be taken in his presence and violence be shown him, or he be put in fear. The violence and putting in fear must be before the taking. For if a man steal a thing, and then keep possession of it by threats of violence or putting in fear, the subsequent violence will not make the larceny robbery. The violence need not be offered to the person; but if offered to a person connected with him by blood or marriage, and money be extorted for the purpose of protecting such relative from violence, the offense will be robbery. A threat to accuse a person of a disgraceful crime is a putting in fear, and to obtain money by that means is robbery. The fear must be sufficient to entirely master the will, so that the person through fear or confusion is unable to oppose the extortion. The giving up of the property need not be the immediate result of the violence, or exactly coincident with it. The robber must get actual possession of the property, but such possession need not last, so that the restoration of the property will not make the crime other than robbery. A sudden taking from the person or hand by surprise without a struggle or injury to the owner, will not, as a rule, constitute robbery. Robbery was anciently punished by death, but the penalty in England and the United States is now imprisonment for life or years.

ROBERT I. (of Scotland). See BRUCE.

ROBERT II., King of Scotland, 1371–90, was b. March 2, 1316, only two years after the battle of Bannockburn. His father was Walter Stewart, and his mother, Marjory, only daughter of Robert the Bruce. Robert lost both his parents in infancy. During the disastrous reign of his uncle, David II., he was one of the most prominent of the patriotic nobles of Scotland, acting as regent, or joint-regent, during the minority and exile of his sovereign. He was present at the battles of Halidon hill (q.v.) and Neville's Cross (see BRUCE, DAVID). On the death of David he obtained the crown, and became the founder of the Stuart dynasty, in virtue of the law of succession adopted by the council of estates held at Ayr in 1315. Partly from disposition, and partly from the infirmities of age, Robert proved a peaceable, though not exactly a pusillanimous ruler. Such wars as were waged with England were not only conducted, but actually organized, by his powerful and intractable barons, particularly the earls of Douglas, Mar, March, and Moray, who shaped the policy of the country very much according to their pleasure. The misery inflicted on both sides of the borders by the raids of these warlike chiefs, and the reprisals of the English wardens—the Percies, and others—was frightful; famine and pestilence became chronic; but the most celebrated incidents of Robert's reign were the invasions of Scotland by an English military and naval force under the command of the duke of Lancaster ("Old John of Gaunt, time-honored Lancaster"), in 1384, and again by king Richard II. himself, in 1385, which wasted the land as far as Edinburgh and Fife; and the grand retaliatory expedition of the Scotch in 1388, when two armies invaded and devastated England: the larger under the earls of Fife and Strathearn, Archibald Douglas, surnamed the Grim, lord of Galloway, and the earls of Mar and Sutherland, penetrating by way of Carlisle; the smaller, under James earl of Douglas ("the doughty Douglas"), and the brothers Dunbar, earls of Moray and March, by way of Northumberland. Both were completely successful. What gives a special interest to the movements of the smaller body is the fact that on its return home it fought and won, though at the expense of the life of its gallant leader, the brilliant battle of Otterburn, July 21, 1388. See Chevy Chase. Robert died at his castle of Dundonald, in Ayrshire, April 19, 1380. According to Buchanan (not, however, a very accurate historian), he labored honestly to suppress the internal disorders of the country; but like most of the Stuarts, he was profligate in his habits. His favorite mistress, Elizabeth Mure of Rowallan, became his second wife.

ROBERT III., King of Scotland, son of the preceding, was b. about 1340. His baptismal name was John, but this name, for reasons not ascertained, was changed on his accession to the throne in 1390, by an act of the Scottish estates or parliament. His imbecility as a ruler virtually placed the reins of government in the hands of his ambitious brother, Robert, earl of Menteith and Fife, whom, in 1398, he created duke of Albany—during whose regime the Scottish barons first began to exercise that anarchic and disloyal authority, which, in the reigns of the first three Jameses, threatened to destroy the power of the sovereign altogether. The principal events in Robert's reign were the invasion of Scotland, in 1400, by Henry IV. of England, who, at the head of a large army, penetrated as far as Edinburgh, but did not inflict much injury on the country, more, however, from clemency than impotence; and the retaliatory expedition of the Scotch, in the following year, under Archibald Douglas, son of the grim earl, which resulted in the terrible disaster at Homildon hill (q.v.). Robert had two sons, the eldest of whom was David, duke of Rothesay, a youth not destitute of parts, but shockingly licentious. As long as his mother lived he kept within bounds, comparatively speaking; but after her death, says Buchanan, "he gave an unbridled license to his passions; laying aside fear and shame, he not only seduced married ladies and virgins of good family, but those whom he could not entice, he forced to his embraces." Albany received orders from the king to act as his guardian, and after a short time, starved him to death in his castle of Falkland—for which he underwent a mock trial by his own creatures, and was of course declared innocent. Sir Walter Scott has given the traditionary version of this tragedy in his romance, *The Fair Maid of Perth.* Robert now became anxious for the safety of his younger son, James; and after consulting with Wardlaw, archbishop of St. Andrews, he resolved to send him to France; but, while proceeding thither, the vessel in which he sailed was intercepted by an English cruiser, and James was taken prisoner in 1405. When his father received the melancholy news, he gave way to paroxysms of grief, and died at Rothesay in the following year.

ROBERT II., surnamed the Devil, was a son of Richard II., and succeeded his brother Richard III. as duke of Normandy in 1087. He combined cruelty and unscrupulousness with energy, audacity, and a handsome figure, which gave origin to his surname Robert the Devil. He regulated his frontiers, humiliated his vassals, and conquered districts from his neighbors; espoused the cause of count Baldwin IV. of Flanders against his sons; of Henry I. of France against his mother; and of his nephews, Alfred and Edward of England, against Canute of Denmark. At the height of his successful career he fell into a state of despondency. He traveled to Rome with a retinue of great splendor, but the next year went to Constantinople with an unpretentious train, and in 1035 made a pilgrimage to the Holy Land to seek consolation and atone for the wild life he had led. He died suddenly after his return at Nicæa, and was succeeded by his son, William the conqueror of England. See Depping, *Histoire de Normandie;* and A. Deville, *Notice Historique sur Robert le Diable,* 1836.

ROBERT, Louis Leopold, 1794–1835; b. in Switzerland, d. in Venice; a French painter; first an engraver, then a student with David and Gérard. Extremely critical of his own works, he has limited their number, but they are of great value. The subjects of his most famous pictures are the following: "The Reapers," "Neapolitan Improvisatore," "Madonna del arco," and the "Fishermen of the Adriatic." He committed suicide from the effect of a hopeless love for a woman of rank. *Léopold Robert, sa vie, ses œuvrés et ses Correspondences,* is the title of his biography, Paris, 1862.

ROBERT-FLEURY, Joseph Nicolas Robert, b. in Cologne 1797; became an eminent French painter; studied with Girodet, Gros, and H. Vernet, and first exhibited in the French salon in 1824. His works followed in rapid succession for many years, and have been widely reproduced in engravings, chromos, and copies. He became full member of the school of fine arts in 1850, and the recipient afterward of many government favors and popular honors. The following are among his noted paintings: "Une Scène de la Saint Barthélemy," 1833, now in the Luxembourg; "Jane Shore, le Colloque de Poissy;" "Une Scène d'Inquisition." His son, Tony, b. Paris, 1837, pupil of Paul

Delaroche, is now one of the leading painters of France, and the recipient of some of the highest medals of the latest French expositions.

ROBERT OF GLOUCESTER, an old English (metrical) chronicler, of whom absolutely nothing is known, except that he was alive about the time of the great battle of Evesham (1265). Robert's work is a "history" of English affairs from the arrival of the fabulous Brutus down to the end of Henry III.'s reign; and is valuable partly for its matter (though that is in the main taken from Geoffrey of Monmouth and William of Malmesbury), but more for the language, which is there seen in its transition from Anglo-Saxon to the English of Chaucer and Wycliffe. It is written in verse, contains more than 10,000 lines, and—if we may judge from the numerous copies that were made of it—was very popular in the middle ages. The principal extant manuscripts are the Bodleian, the Cottonian, and the Harleian. The chronicle was printed by Hearne, in 2 vols., 1724, a reprint of which appeared in 1810.

ROBERTS, BENJAMIN S., 1811–75; b. Vt.; graduated at West Point, served in the Mexican war and the war against rebellion, and attained the rank of maj.gen. of volunteers.

ROBERTS, DAVID, R.A., a painter of great eminence, was b. at Edinburgh on Oct. 24, 1796, and began life there as apprentice to a house-painter. His talent for art becoming obvious, he was set to study at the Trustees' academy; and in 1822 he went to London, where he found employment as a scene-painter at Drury Lane theater. Clarkson Stanfield, since famous as a marine-painter, was then also working at Drury Lane, and between him and Roberts an affectionate intimacy ensued, which ceased only with life. In 1826 a picture of "Rouen Cathedral," exhibited by Roberts at the royal academy, drew attention by its marked ability. The year after appeared his painting of "St. Germains at Amiens." Shortly after he left England, and for seven years was engaged in sketching in Spain, Africa, and the east. As the result of his labors, there was given to the world in 1839 the splendid work, in 4 vols., entitled *Sketches in the Holy Land, Syria, Idumæa, Arabia, Egypt, and Nubia*. The book contains 246 subjects, lithographed by Louis Hague, and illustrated by a historical commentary furnished by Dr. Croly. It is the finest and most elaborate thing of the kind perhaps ever produced, and of itself it would have sufficed for a great reputation to the artist. Pending its appearance, he had resumed his contributions to the academy, of which in 1839 he was elected an associate; the full dignity of academician being conferred on him two years after. From this time forward he grew steadily in fame, and in 1854 he was selected by the queen to paint for her the "Inauguration of the Great Exhibition in 1851," a task which he achieved with admirable success. In his chosen field of architecture, during all his later life, he was admittedly without a rival. In addition to his unremitting work for the academy he illustrated many books, and issued the admirable series of lithographs, "Spanish Sketches," which attained a great popularity. He died Nov. 25, 1864.

ROBERTS, ELLIS H., LL.D., b. New York, 1827; learned the trade of printing; graduated at Yale college in 1850; became editor and proprietor of the Utica *Morning Herald;* was a member of the state legislature in 1867, and of congress 1871–75. As an editor he has for years had a wide influence.

ROBERTS, ROBERT RICHFORD, D.D., 1778–1843; b. Md.; ordained in the Methodist Episcopal church in 1804; pastor of churches in Baltimore, Alexandria, Georgetown, and Philadelphia; in 1815 appointed presiding elder of the Schuylkill district, and, on the death of bishop Asbury, elected president of the Philadelphia conference in 1816: in May of the same year was elected bishop. He resided at first in Pennsylvania, afterward in Indiana. In 1819 he traveled over 5,000 miles. He had good oratorical gifts, and much modesty and gentleness.

ROBERTSON, a co. in n.e. Kentucky, bounded on the s. and w. by the Licking river; drained by it and the n. fork of the Licking; about 175 sq.m.; pop. '80, 5,814—5,782 of American birth. The surface is rolling or hilly. The soil is fertile. The principal productions are corn, wheat, and tobacco. Co. seat, Mount Olivet.

ROBERTSON, a co. in n. central Tennessee, adjoining Kentucky; drained by Red river and Sulphur fork; traversed by the St. Louis and South-eastern railroad; 500 sq.m.; pop. '80, 18,862—18,803 of American birth, 5,618 colored. The surface is hilly, and there are extensive forests; tobacco, wheat, corn, and pork are the staples. The chief export is whisky, which is made in large quantities and of remarkable excellence. Co. seat, Springfield.

ROBERTSON, a co. in central Texas, bounded on the e. by the Navasoto river, and on the w. by the Brazos, drained by their tributaries; crossed by the Houston and Texas Central, and the International and Great Northern railroads; 840 sq.m.; pop. '80, 22,383. The surface is undulating, partly prairie, and partly covered with forests of valuable timber; the soil is fertile, and rich bottom lands border the streams. The principal products are corn, cotton, and wool; sheep and swine are raised in large numbers. Co. seat, Calvert

ROBERTSON, CHARLES FRANKLIN, S.T.D., b. New York, 1835; graduated at Yale college in 1859; at the general theological seminary (Protestant Episcopal) New York, in 1862; was rector of several churches, and consecrated bishop of Missouri in 1868.

ROBERTSON, FREDERICK WILLIAM, M.A., an English preacher, was the son of a Scotch gentleman, capt. Frederick Robertson of the royal artillery, and was b. in London Feb. 3, 1816, in the house of his grandfather, col. Robertson. At the age of 9 he was sent to the grammar-school of Beverley, in Yorkshire, where he remained for a few years, and then accompanied his parents to the continent, where he became a proficient in French. In 1832 he entered the rector's class at the Edinburgh academy, and there competed, we are told, "all but successfully," for the highest classical honors of the institution with James Moncreiff (now lord justice-clerk for Scotland). Next year Robertson proceeded to the Edinburgh university, and while there had for private tutor the rev. Charles Terrot, subsequently bishop of the Scottish Episcopal church in the same city. He was originally designed for the bar, but the study of law did not prove interesting to him, and he would gladly have become a soldier, for he always felt (as he afterward confessed) "an unutterable admiration of heroic daring;" but certain difficulties intervened in the way of obtaining a commission, and Robertson, in obedience to the wish of his father, entered Brasenose college, Oxford, to study for the church, in 1836. His life had all along been marked by its singular purity and depth of religious feeling; hence his new career inspired him with no regret, but rather with a high resolve to be worthy of his calling. His first appointment was to the curacy of St. Maurice and St. Mary Calendar, but his health broke down in the course of a year, and he was compelled to visit the continent. On his return to England he was for a time curate to the incumbent of Christ church, Cheltenham, whence, in the beginning of 1847, he removed to St. Ebbes, Oxford, and was just beginning to attract the notice of the undergraduates at Oxford when he was offered the incumbency of Trinity chapel, Brighton. His "career" in Brighton—though it is perhaps wrong to describe a life so pure, delicate, unselfish, devoted as his by a term expressive of vulgar ambition—was brief but glorious. For six years he continued to preach sermons, the like of which, for blending of delicacy and strength of thought, poetic beauty, and homely lucidity of speech, had perhaps never been heard before in England. Robertson was unhappily (for his comfort) not very "orthodox;" consequently he was long misunderstood, and vilified by the "professedly religious portion of society;" but so true, so beautiful, was his daily life and conversation, that he almost outlived those pious calumnies, and his death (from consumption, Aug. 15, 1853) threw the whole town into mourning. His sermons (of which four series have been published) have attained great popularity and a very large circulation. The first series was published in 1855 (11th edition, 1863). Robertson's *Expository Lectures on St. Paul's Epistle to the Corinthians* appeared in 1859. His *Lectures and Addresses on Literary and Social Topics* contain passages of faultless beauty and refinement; but as they were delivered to mixed audiences, and never intended for publication, they do not perhaps exhibit that rigorous intellectual grasp of a subject, or that strong and searching criticism of which their author was so capable. A good biography, with letters, was published in 1865 by the rev. Stopford A. Brooke (5th ed. 1868).

ROBERTSON, JAMES, 1725–88; b. Scotland, took part in the campaign against Louisburg and Ticonderoga. He was made maj.gen. in 1776, and led a brigade at the battle of Long Island. He was appointed royal governor of New York in 1779, and lieut.gen. in 1782.

ROBERTSON, JAMES, 1742–1814. b. Va.; emigrated to Tennessee in 1769, and was one of the founders of the Cumberland settlements. He was appointed brig.gen. and commander of the Tennessee militia in 1790, and for the last part of his life was agent of the United States to the Chickasaw Indians.

ROBERTSON, JAMES CRAGIE, D.D., b. Scotland, 1813; graduated at Trinity college, Cambridge, in 1834; ordained in the English church: became vicar of Beaksbourne in 1845; canon of Canterbury in 1859; professor of church history in King's college, London, in 1864. His chief work is *History of the Christian Church from the Apostolic Age to the Reformation*, 8 vols. He has published also, *How shall we conform to the Liturgy of the Church of England; The Bearings of the Gorham Case; Becket, Archbishop of Canterbury, a Biography; Church History during the First Six Centuries.*

ROBERTSON, JOSEPH, the most accomplished Scottish antiquary of the present century, was b. at Aberdeen on May 17, 1810. He was educated at Udny, in his native county, at the grammar-school of Aberdeen, and afterward at the Marischal college there. The law was chosen for him as his profession, but his heart was not in the task, and from an early age he devoted himself to literature. His chief attention then, as in his after life, was directed to researches connected with the history and antiquities of Scotland; and in 1833 he went to Edinburgh, the place of all others best adapted for the cultivation of his favorite studies. While there he wrote for Oliver and Boyd's Cabinet Cyclopædia a volume on the *Circumnavigation of the Globe*, which was published in 1836. The work by which he became first generally known, *The Book of Bon-accord, or a Guide to the City of Aberdeen*, was published in 1839. It is justly styled by Mr. Charles Knight, in his *Life of Shakespeare,* "a most lively, instructive, and learned volume—a model of guide-books." A continuation of this work was promised, but was never completed. In the following year his *Deliciæ Literariæ, a new volume of Table-talk,* was published. In 1839 he returned to the north to undertake the editorship of the *Aberdeen Constitutional* newspaper; and in the end of that year, in conjunction with Mr. John Stuart, he founded the Spalding club, a society instituted for printing the historical, ecclesiastical, genealogical, topographical, and literary remains of the n.e. counties of Scotland. This society, formed on the model of the Bannatyne and Maitland clubs, has printed many valuable works on Scottish archæology, which otherwise would have been all but inaccessible. Its earliest publication was a *History of Scots Affairs from* 1637 *to* 1641, written by James Gordon, parson of Rothiemay, which was issued in three vols. in 1841, under the joint editorship of Mr. Robertson and Mr. Grub. Robertson edited for the same club a volume of *Collections for a History of the Shires of Aberdeen and Banff* (1843); three vols. of *Illustrations of the Topography and Antiquities of the Shires of Aberdeen and Banff* (1847, 1857, and 1862); and *Passages from the Diary of General Patrick Gordon of Auchleuchries* (1856). He also contributed to the fifth volume of the miscellany of the club, in 1852, a learned paper *On Scholastic Offices in the Scottish Church in the 12th and 13th Centuries.* In 1843 Robertson went to Glasgow to become editor of the *Glasgow Constitutional* newspaper. While in that city he edited for the Maitland club, in 1846, a volume containing the *Book of the Collegiate Church of St. Mary and St. Anne, Glasgow,* and the *Chartulary of the Black Friars of Glasgow;* and in 1847, the fourth volume of the miscellany of the club. In June, 1849, he contributed to the *Quarterly Review* an article on Scottish abbeys and cathedrals, which has become a text-book for all who write on that subject. In the same year he once more took up his residence in the Scottish metropolis, on being appointed editor of the *Edinburgh Evening Courant.* He discharged his editorial duties at Aberdeen, Glasgow, and Edinburgh with faithfulness and ability; but he found a more congenial occupation when, in 1853, he was appointed, through the earl of Aberdeen, who knew and appreciated his merits, to the office which is now known as that of curator of the historical department of the register-house at Edinburgh. In 1863 he edited for the Bannatyne club the *Catalogues of the Jewels, Dresses, Furniture, Books, and Paintings of Mary Queen of Scots.* This volume contains a preface which forms a most valuable contribution to the history of Mary's reign, and supplies information on almost all the controversies connected with her life. With the sanction and zealous encouragement of sir William Gibson-Craig, lord clerk-register of Scotland, he projected the publication of a series of works connected with the history of Scotland, similar to those which have appeared in England under the direction of the master of the rolls. The first volume of the series, the chronicles of the Picts and Scots, has been edited by Mr. Skene, and several others have since been published. Robertson assisted in other literary undertakings, and was a valuable contributer to this *Encyclopædia.* His articles are generally connected with his favorite studies; among them are those on ARCHÆOLOGY, BURGH, ST. COLUMBA, CRANNOGES, the CULDEES, DAVID I., the FAMILY OF DOUGLAS, IONA, MARY STEWART, and OSSIAN. The last and most important of Robertson's works was his *Concilia Scotiæ,* printed in two vols., in 1866, for the Bannatyne club. This work has done for the Scottish church that which archdeacon Wilkins did for the church of England in his *Concilia Magnæ Britannia et Hiberniæ.* It contains the statutes of all the Scottish councils, whether provincial or diocesan, from the earliest period to the reformation, printed carefully from the best authorities; and the preface, which occupies the greater part of the first volume, is a learned and authentic history of the councils, and of everything bearing on the subject of them. The authorities are quoted with an accuracy and copiousness for which Robertson was remarkable, and which contrasts strongly with the carelessness in that respect which marks some popular historians of the present day. In April, 1864, Robertson received the degree of LL.D. from the university of Edinburgh. He died on Dec. 13, 1866, almost immediately after the publication of his *Concilia Scotiæ.* Robertson's labors were not to be estimated merely by the works which appeared under his name, or which he is known to have written. There was hardly a work of any merit published during the last twenty years of his life, in connection with Scottish history and antiquities, to which he did not in some way or other give his assistance; and his assistance was given with a thorough heartiness which only those who have benefited by it can appreciate. No literary man of his time was more beloved by his friends and intimate associates. In the relations of private life, he was most exemplary.

ROBERTSON, THOMAS WILLIAM, 1829–71; b. England, actor and author, played in the company of which his father was manager, was a writer in London for many years, contributing to the popular magazines and producing very successful plays. *A Night's Adventure* had an auspicious opening at the Olympic theater 1851: and *Society,* opportunely brought out at the opening of the Prince of Wales' theater 1865, made the author suddenly famous. *David Garrick* has had a great run with Sothern in the title role; and his plays of *Ours, Caste,* and *School,* have been equally popular. He published a novel of David Garrick founded on the comedy. In 1869, associated with J. C. Hotten, he edited Artemas Ward's *Lecture at the Egyptian Hall* (illustrated) *and other Relics of the Humorist.*

ROBERTSON, William, the historian, was born in the year 1721, in the county of Edinburgh, and in the parish of Borthwick, of which his father was minister. He went to school at Dalkeith, a few miles distant from his home; but in 1733 his father's appointment to a charge in Edinburgh gave him the opportunity of attending school and college there. He was licensed as a preacher in 1741, and in 1743 was ordained to the parish of Gladsmuir, where the battle of Prestonpans was to be fought two years afterward. In "the '45," he showed his zeal for the government cause by joining a body of volunteers formed in Edinburgh; and when the majority of his comrades saw that it was useless for them to attempt to defend the town, he, with a few whom he had infected with his ardor, went to offer their services to sir John Cope. The latter, conscious that he had already too many elements of imperfect discipline in his army, had the prudence to decline this offer. Robertson afterward became a leader in what was called "the moderate" side in the ecclesiastical courts; and in 1758 was promoted to one of the Edinburgh charges, where he had increased opportunities of influence. In 1759 he published his celebrated *History of Scotland.* He avowedly passed over the earlier periods, speaking of them as "dark and fabulous," which no doubt they were in the hands of those who had treated them; but it may be regretted that Robertson did not bring his acuteness to bear on the materials for their elucidation. In 1762 he was made principal of the university of Edinburgh. In 1769 he published the *History of the Reign of the Emperor Charles V.*, to which he prefixed a *View of the State of Society in Europe from the subversion of the Roman Empire to the beginning of the Sixteenth Century.* This is the most valuable of his works. The field has been often since gone over by authors who have discovered much new material, but all the use they have made of it has become a sort of tribute to the natural sagacity of Robertson. His *History of America* was published in 1777. These works are admirable for their elegant and vigorous style. Robertson died in 1793. He was a genial man, with a large circle of friends. He had great conversational powers, and was reputed to be fond of displaying them. Interesting notices of his early life will be found in the autobiography of his friend Dr. Carlyle, and a sketch of the closing years is given in lord Cockburn's *Memorials of his Life and Times.*

ROBERTSON, William H., b. Bedford, N. Y., 1823; received an academic education, and studied and practiced law. In 1849–50 he was a member of the New York state assembly; and a member of the state senate in 1854–55. He was judge of Westchester county, N.Y., for twelve years; a presidential elector in 1860 and in 1880; and was elected a representative in the 40th congress as a republican, serving 1867–69. In 1881 he was appointed by president Garfield for the position of collector of the port of New York, being at the time a member of the state senate, to which he had been elected in 1875.

ROBESON, a co. in s. North Carolina, adjoining South Carolina, drained by Lumber river, Little Pedee river, and Rockfish creek; traversed by the Carolina Central railroad; about 990 sq.m.; pop. '70, 16,262—16,221 of American birth, 737 colored. The surface is mostly level woodland. The soil is sandy. The principal productions are corn, cotton, potatoes, turpentine, and tar. Co. seat, Lumberton.

ROBESON, George M., b. N. J., 1827; graduated in 1847 at Princeton college; studied and practiced law. In 1859 he was prosecuting attorney for Camden co., N. J. At the beginning of the war of the rebellion he was appointed brig.gen., of volunteers, was efficient in the organization of the state troops, and served during the war. In 1867 he was attorney-general of New Jersey, and held the position two years. He was appointed secretary of the navy by president Grant, and continued in that office from June, 1869, to the close of the administration. He was elected a republican member of the 46th congress, from Camden, N. J., and served through the term.

ROBESPIERRE, Maximilien Marie Isidore de, was born May 6, 1758, at Arras, where his father was an unsuccessful advocate. Having distinguished himself at the college of his native place, he was sent through the influence of a canon of the cathedral of Arras, to complete his education in Paris, at the college of Louis le Grand, where, by a singular chance, he found himself a fellow-student with Fréron, and Camille Desmoulins. In his studies, he was noted for diligence, regularity, and intelligence; and on the completion of his course at college, he devoted himself to the study of jurisprudence. After some years thus passed, he returned to Arras, to follow the profession of his father. In this his success was decided; and previous to the commencement of his more public career, he had become a person of considerable local note. While sedulously attending to his professional duties, he cultivated literature, not wholly without distinction; and in 1783 became a member of the Academy of Arras. Of the verses, which at this time he seems to have been fond of writing, some curious fragments are preserved. Having, it is said, in discharge of his duty as member of the criminal court, been obliged to condemn a culprit to death, he resigned his situation on a point of conscientious objection to the barbarity of capital punishment—an incident sufficiently piquant in its contrast with subsequent portions of his history. On the memorable convocation of the states-general in 1789, he had local influence sufficient to secure his election as one of the deputies of the *tiers-état*, in which capacity he immediately repaired to Versailles. In the assembly, he was for some time of little account; but gradually he made for him-

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self a position, and nice observers noted in him a quality of fanatical earnestness and conviction, in virtue of which they surmised for him a great career. "This man," said Mirabeau in particular, "will go far, for he believes every word he says." (*Cet homme ira loin, car il croit tout cé qu'il dit*). Though in the constituent assembly he spoke frequently, and—despite the disadvantages of a mean person, a harsh shrill voice, and an ungainly manner—always with increasing acceptance, it was outside as a popular demagogue and leader in the famous Jacobin club that his chief activity was exerted; and in this field his influence speedily became immense. After the death of Mirabeau, whose giant figure, whilst he lived, seemed to dwarf all meaner men, his importance became more and more recognized; and from this time forward till his death his biography is in effect the history of the revolution. In May, 1791, he proposed and carried the decree by which members of the assembly were excluded from a place in the legislature which succeeded; a measure obviously disastrous, as deteriorating the quality of the assembly, and more and more insuring its subjection to the Jacobins, of whom Robespierre was now the idol. His early aversion to capital punishment has been spoken of; and it is curious enough to be noted, *en passant*, that now, on the 30th of May, he delivered an oration against it in the assembly, denouncing it as "base assassination." On the dissolution of the constituent assembly in Oct., 1791, Robespierre, now famous, revisited his native town, where he was received with enthusaism; an escort of the national guard did honor to his entrance, and a general illumination of the place testified the admiration of the citizens for their deputy. After a stay of seven weeks, he returned to Paris, and resumed his activity as a leader of the Jacobin club. In the *émeute* of August 10, following, by which the king was dethroned, he took no prominent part; and though his complicity is suspected in the September massacres which ensued, no very distinct share in the infamy has ever yet been proved against him. To the national convention, which was now formed, he was returned at the head of the Paris deputies; and as recognized chief of the extreme party called the Mountain, he was one of the main agents in procuring the execution of the king, which took place in Dec., 1792. In the following year occurred his final struggle with the Girondists, who had twice before attacked him with a view to compass his destruction, and the chief men among whom he now triumphantly sent to the scaffold. The period of "the terror" followed: Marie Antoinette and the infamous duke of Orleans were the first victims; Pétion, Danton, and Camille Desmoulins were next immolated, on a suspicion of favoring a reactionary policy; and for months, under the so-called committee of public safety, Paris became the scene of an indiscriminate *quasi*-judicial slaughter, in which some thousands of lives were sacrificed. With these enormous atrocities, the name of Robespierre, along with those of his friends, Couthon and St. Just, remains peculiarly associated. In the midst of the horror, took place, on June 8, 1794, that strange *Fête de l'Etre Suprême*, in which, in the name of the republic, the existence of a deity was decreed—a day of triumph for Robespierre, who, conspicuous as the first man in France, presided at the solemn mummery. But the end was near; men were weary of "the terror," and the general sense of insecurity it induced; Robespierre had many enemies; in particular, the numerous friends of Danton were eager to avenge his death; a conspiracy was organized against "the tyrant," as he was now called, and after a scene of fierce tumult in the convention, his arrest was accomplished. A rescue by the populace followed, but he lacked the courage and promptitude to turn the opportunity to account; while he hesitated, his enemies acted, and in July, 1794, he closed his career on the scaffold to which he had sent so many others.

Though without great and heroic qualities, Robespierre can scarcely have been the mean and contemptible creature he has not unfrequently been represented. The instant effect of his oratory we know; and even as read, his speeches command respect for the mental power they exhibit. The subtlest practical tact and judgment he must plainly have possessed; and though timid in his own person, he was dexterous to appropriate the results obtained by the boldness of others. In principle he was severe and consistent; and the title of "incorruptible," which he early acquired, seems throughout to have been thoroughly deserved. In private life he was amiable; and though he waded to his public ends through blood, he had not the savage joy in the shedding of it which it has been common to attribute to him. He was callous, not actively cruel; and during the time of "the terror," it is simply the truth, that he was rather reluctantly acquiescent, than active in the atrocities for which he has since been held above all others responsible. "Death—always death!" he is said to have frequently exclaimed in private, "and the scoundrels throw it all on me! What a memory shall I leave behind me, if this lasts! Life is a burden to me." For a candid view of the character on this and its other sides, the more curious reader may be referred to the work on the subject by Mr. G. H. Lewes—*Life of Maximilien Robespierre, with Extracts from his Unpublished Correspondence* (London, Chapman and Hall, 1849). See also the Histories of Thiers, Mignet, Carlyle, Michelet, Louis Blanc, and Ernest Hamel's *Vie de Robespierre* (Par. 1865).

ROBIN, besides being a familiar name of the redbreast (q.v.) in Britain, and frequently given to the bluebird (q.v.) in America, is also in America the usual name of a species of thrush (q.v.) widely distributed from Mexico to lat. 60° north. It is nearly twice the size of the redbreast, olive gray, the top and sides of the head black, the chin and throat white with black streaks, the under parts chestnut brown. It remains during winter in sheltered places, even as far n. as New England, but is generally a bird of passage. Many arrive in New-England before the snow has disappeared. Large flocks are to be seen in the southern states in winter, where great numbers are killed for the table, the markets being often glutted with them. In Massachusetts, the law forbids the killing of this bird at any season of the year. Its nest is often built near houses. Two broods are produced in the year. The robin is a lively bird, and a general favorite in the northern parts of the United States. It is often kept as a cage-bird, is very gentle and easily tamed, and has a pleasing song.

ROBIN, CHARLES PHILIPPE, b. 1821; a French physician and student of natural science; a prolific author of biological, entomological, medical, and anatomical works, and member of the left in the republican party of the legislative chamber in 1876–77. Among his works are: *Des Fermentations; Mémoires sur l'Existence d'un Œuf ou Ovule, chez les Mâles comme chez les Femelles des Végétaux comme des Animaux*, read before the institute in 1848, and reproduced in other languages. This has been followed by a great number of publications on medical subjects. His latest work, 1877, is entitled *L'Instruction et l'Education.*

ROBIN GOODFELLOW, a name given in England to a domestic spirit or fairy, analogous in character to the *Nisse God-dreng* of Scandinavia, the *Knecht Ruprecht*, i.e., Robin of Germany, and the *Brownie* of Scotland. Roguery and sportiveness were the characteristics of this spirit; and in the reign of Elizabeth, his existence was so generally credited, that he was "famozed in every old wives' chronicle for his mad merrye prankes." It was from the popular belief in this spirit that Shakespeare's "Puck" was derived. From the early ballads concerning Robin, we learn that he was the offspring of a "proper young wench by a hee-fairy," who was no less a person than Oberon, king of Fairyland. In his youth, Robin displayed such mischievous tricks that his mother found it necessary to promise him a whipping. He ran away from home, and engaged with a tailor, from whom he also eloped. When tired, he sat down, and fell asleep, and in his sleep he had a vision of fairies. On awaking, he found lying beside him a scroll, evidently left by his father, which, in verses written in letters of gold, informed him that he should have anything he wished for, and also the power of turning himself into various shapes; but he was to harm none but knaves and queans, and was to "love those that honest be, and help them in necessity."

As a specimen of his "mad prankes," Robin went one day to a wedding as a fiddler, and was a welcome guest; but in the evening "then hee beganne to play his merry trickes in this manner. First, hee put out the candles, and then being darke, hee strucke the men good boxes on the eares; they, thinking it had beene those that did sit next them, fell a-fighting one with the other, so that there was not one of them but had either a broken head or a bloody nose. At this, Robin laughed heartily. The women did not scape him, for the handsomest he kissed: the others he pinched, and made them scratch one the other, as if they had beene cats. Candles being lighted againe, they all were friends, and fell againe to dancing, and after to supper. Supper being ended, a great posset was brought forth. At this, Robin's teeth did water, for it looked so lovely that hee could not keepe from it. To attaine to his wish, he did turne himself into a beare: both men and women seeing a beare amongst them, ranne away, and left the whole posset to Robin. He quickly made an end of it, and went away without his money, for the sport hee had was better to him than any money whatsoever."

Although Robin was a sprite particularly fond of disconcerting and disturbing domestic peace, he was believed to be easily propitiated. If a bowl of milk, or curds and cream, were duly laid out for him, he would at midnight perform for the servants many household duties. If this were neglected, Robin would revenge himself by pinching and otherwise annoying the inmates. The following passage in Shakespeare's *Midsummer Night's Dream* fully describes Robin's peculiarities:

> Either I mistake your shape and making quite,
> Or else you are that shrewd and knavish sprite
> Call'd Robin Goodfellow: are you not he
> That frights the maidens of the villagery;
> Skims milk, and sometimes labors in the quern,
> And bootless makes the breathless housewife churn;
> And sometime makes the drink to bear no barm;
> Misleads night-wanderers, laughing at their harm?
> Those that hobgoblin call you, and sweet Puck,
> You do their work, and they shall have good-luck.

The *Mad Pranks and Merry Jests of Robin Goodfellow* have been reprinted from the edition of 1628 by the Percy society in 1841.

ROBIN HOOD. See HOOD, ROBIN, *ante.*

ROBINIA, a genus of trees and shrubs of the natural order *leguminosæ*, suborder *papilionaceæ*, having a 4-fid calyx, with the upper segment divided into two; stamens, nine united, and one free; the pod long and many-seeded. The species are widely diffused over the world. The most important is a North American tree, sometimes called the *locust tree* (q.v.), also known as the *false acacia*, or *thorn acacia*, often simply designated *acacia.* It was raised from seed in France by John Robin, about the year 1600, and gradually spread over the warmer parts of Europe and the s. of Siberia. On account of its thick growth, its spines, and its property of submitting to be clipped into any form, it is very suitable for hedges. In the s. of Europe, it succeeds well as a timber tree, but in more northern regions, it suffers from frost in severe winters; and in Britain it often suffers from frost, owing to the imperfect ripening of the wood in summer, The wood is compact, hard, and takes a fine polish; for many purposes, it is scarcely inferior to oak, which it rivals in toughness and strength. It does not readily rot in water, and is used for ship-building. The tree is very ornamental, and of rapid growth. It is found wild in abundance from the Alleghanies to the Rocky mountains. Its leaves are pinnate, with 9 to 18 thin and smooth leaflets. The flowers are fragrant and white, in large pendulous racemes. The roots throw up many suckers; and are very sweet, affording an extract resembling licorice. An agreeable syrup is also made from the flowers.—*R. viscosa* is a smaller tree, but even more ornamental, a native of the south-western parts of the Alleghany mountains. It has rose-colored scentless flowers. The young branches are viscid.—The ROSE ACACIA (*R. hispida*) is a native of the south-western ranges of the Alleghanies, and is a highly ornamental shrub, with hispid branches, and large rose-colored scentless flowers.—*R. Caragana* is a native of the s.e. of Europe, and is planted for hedges at St. Petersburg, where it spreads like an indigenous plant.

ROBINS, BENJAMIN, a celebrated English mathematician and artillerist, was b. at Bath in 1707, of parents who belonged to the society of Friends, and who were in such poor circumstances as to be unable to give their son a good education. Robins, however, having obtained a little instruction in mathematics, prosecuted this branch of science with great zest, and having acquired a good elementary knowledge of it, he removed, by the advice of Dr. Pemberton, to London, where he set up for a teacher of mathematics. During his leisure hours, he improved himself in his favorite subject by reading the works of the ancient and modern geometers, and by the study of the Latin, Greek, and several modern languages. He also published several mathematical treatises, which gained for him considerable reputation. Robins next commenced the series of experiments on the resisting force of the air to projectiles, which has gained him so much celebrity, varying his labors by the study of fortification; a science with which he obtained a practical acquaintance by visiting many of the most celebrated works of this class in Flanders. In 1734 he demolished, in a treatise entitled *A Discourse concerning the Certainty of Sir I. Newton's Method of Fluxions*, the objections brought by the celebrated Berkeley, bishop of Cloyne, against Newton's principle of ultimate ratios. His great and valuable work, the *New Principles of Gunnery*, upon the preparation of which he had spent an enormous amount of labor, appeared in 1742, and produced a complete revolution in the art of gunnery. Previous to Robins's time, it had never been attempted to estimate the velocity of balls otherwise than by the ordinary parabolic theory of Galileo (see PROJECTILES). Robins suggested two methods for obtaining this information—viz. (1), by finding experimentally the initial force of fired gunpowder confined to a certain space, and the law of the decrease of this force as the space increased, thence calculating the velocity which would be imparted to a body of given weight; and (2) by the *ballistic pendulum.* The second method has been found in practice to be more preferable for accuracy. Robins, in the course of his experiments, also discovered and explained the curvilinear deflection of a ball from a vertical plane. Some of his opinions having been questioned in the *Philosophical Transactions*, Robins ably replied to these objectors, and also wrote several dissertations on the experiments made by order of the royal society in 1746–47, for which he received their annual gold medal. In consideration of his able defense of the policy of the then government, by means of pamphlets which he wrote and published from time to time, he received (1749) the post of "engineer-in-general to the East India company;" but his first undertaking, the planning of the defenses of Madras, was no sooner accomplished than he was seized with a fever, and though he recovered from it, his vital energy had been exhausted, and he died July 29, 1751. Robins was considered as one of the most accurate mathematicians of his time. His mathematical works were collected after his death, and along with the details of his latest experiments in gunnery, were published by Dr. Wilson in 1761. It may also be mentioned that Robins had some share (to what extent is now unknown) in the composition of Anson's *Voyage Round the World* (1740–44).

ROBINSON, BEVERLEY, 1723–92; b. Va.; son of John Robinson, president of the council of Virginia, 1734. He was present at the siege of Quebec, under Wolfe, in 1759, with the rank of maj. He married the daughter of Frederick Phillipse, a rich landowner on the Hudson river. In the revolutionary war he was col. of the loyal American regiment, a tory organization, which he raised. His country house was the scene of the preliminary arrangements for the treasonous plot in which Arnold was the central figure, and in which he himself was intimately concerned. After the war he retired with a part of his family to England, a heavy loser by his political ventures.

ROBINSON, Rev. EDWARD, D.D., LL.D., philologist and biblical scholar, was b. at Southington, Conn., April 10, 1794, graduated at Hamilton college, Clinton, in the state of New York, in 1816, where he was engaged as tutor and in pursuing his studies until

1821, when he went to Andover, Mass., to superintend the printing of an edition of the first six books of the *Iliad*, previous to which he had married, and become a widower. He studied Hebrew with prof. Stuart at Andover, to whom he became an assistant professor. In 1826 he began four years' travel and study in Europe, where he married Miss Therese A. L. von Jakob, daughter of a professor at Halle. Returning in 1830 to Andover, he was appointed extraordinary professor of sacred literature, and librarian, but resigned in 1833, removed to Boston, and in 1837 was appointed professor of biblical literature in the Union theological seminary, city of New York. At this period he made, in company with rev. Eli Smith, an extensive survey of Palestine, of which he gave an account in his admirable work, entitled *Biblical Researches in Palestine and Adjacent Countries* (3 vols. 8vo, Halle, London, and Boston, 1841)—which will always remain a standard work on the subject. He entered upon the active duties of his professorship in 1840; and in 1852 made a second visit to Palestine, of which he published an account in 1856. His other works are a translation of Buttman's *Greek Grammar*, 1832 and 1850; *Greek and English Lexicon of the New Testament*, 1836 and 1850; *Harmony of the Four Gospels*, in Greek, 1845, and in English, 1846. He was also editor of the *Biblical Repository*, *Bibliotheca Sacra*, Calmet's *Bible Dictionary*, a translation of Gesenius's *Hebrew Lexicon*, etc., and was an active member of geographical, oriental, and ethnological societies. He died in 1864.

ROBINSON, Ezekiel Gilman, d.d., ll.d., b. Mass., 1815; graduated at Brown university in 1838, and Newton theological seminary in 1842; was ordained and settled as pastor of a Baptist church, Norfolk, Va., 1842; became professor of Hebrew in 1846 in the theological seminary at Covington, Ky.; professor in 1853 in Rochester theological seminary, and subsequently its president. In 1872 he was elected president of Brown university, which position he still fills. He was the translator of Neander's *History of the Planting of the Church;* published an address on the *Relation of the Church and the Bible;* and edited the *Christian Review* 1859–64. He is an effective and popular preacher.

ROBINSON, Henry Crabb, 1775–1867; b. England; studied law in London and elsewhere, and spent five years in German universities, studying German philosophy and literature, and was admitted to intimacy with the creators of modern German poetry, Schiller, Goethe, Wieland, and others. In 1808 he went to Spain and wrote to the London *Times* letters descriptive of the peninsular campaign. He afterward became a regular editorial writer and literary critic of that paper. In 1813 he began the practice of law and within fifteen years had acquired a fortune large enough to allow him to indulge his taste for literature and the society of literary men. Among his intimate friends were Wordsworth, Lamb, Coleridge, Southey, Flaxman, Clarkson, Charles G. Loring, a leader of the Boston bar, and many others. After his death selections from his *Diary* and *Correspondence* were published under that name. He took part in founding the Flaxman gallery and University college, both in London.

ROBINSON, James S., b. Ohio, 1828; entered the 4th Ohio volunteers in 1861, served through the Rich mountain campaign, and was promoted maj. He became col. the next year, was with Fremont in the Shenandoah valley, took part in the second battle of Bull Run, was dangerously wounded at Gettysburg, and commanded a brigade in Sherman's southern campaign. He fought at Resaca, Dallas, Averyborough, and in other engagements, and left the army at the close of war with the rank of brevet maj.gen.

ROBINSON, John, 1575–1625; b. England; educated at Cambridge; held a benefice near Yarmouth in Norfolk, but was suspended by the bishop for nonconformity; formed a church of Independents at Norwich in 1602. Persecuted by the government, its members in 1607 attempted to leave for Holland, but were prevented by the civil officers. In 1608 they renewed the attempt with success and reached Amsterdam, which in a year they left for Leyden. Here they remained 11 years, and the church was enlarged to 300 by the arrival of English exiles. In 1613 Robinson had a controversy on free-will with Episcopius, the successor of Arminius, professor in the university of Leyden. Persecuted still by archbishop Laud, the pastor favored a removal to America. In the beginning of 1620 they kept a day of fasting and prayer, and in accordance with the decision, elder Brewster with a part of the congregation set out Jan. 21 in two ships, the *Speedwell* and *Mayflower* The vessels sailed Aug. 5, 1620, from Southampton with 120 passengers. The *Speedwell* being leaky put in at Dartmouth for repairs. Again, Aug. 21, they sailed, when both ships proving unseaworthy, they put back to Plymouth, 20 left the *Speedwell*, and the rest, 101, went on the *Mayflower*. Robinson intended to follow, but died before the arrangements were complete. Nov. 9, cape Cod was sighted, and the next day the *Mayflower* entered the harbor. They called it Plymouth. Before disembarking they formed a democratic government, and elected John Carver governor for a year. The remainder of Robinson's church with his widow and sons John and Isaac emigrated not long after his death. Robinson was a man of profound faith, a thorough classical scholar and a keen controversialist. He published *A Justification of Separation from the Church of England; Of Religious Communion; A Defense of the Doctrine Propounded by the Synod of Dort; A Treatise of the Lawfulness of Learning of the Ministers in the Church of England; Essays or Observations Divine and Moral.* His complete works have been published in 3 vols. by the Congregational board of publication.

ROBINSON, John Cleveland, 1817–80; b. Binghamton, N. Y.; left the military school after three years study, and in 1838 began the study of law; returned to the army; was in the Mexican war; distinguished himself at Monterey, and rose to be col. He served in the Indian wars of Florida and Utah; and during the war of the rebellion was commandant at fort McHenry, Baltimore; commanded 1st brigade of gen. Kearney's division of the corps under gen. Heintzelman, and was distinguished for gallantry in the seven days' battle before Richmond, 1862, at Chantilly, and at Fredericksburg. He commanded a division through the peninsular campaign, and lost a leg at Todd's Tavern. His record shows 3 brevets in the regular army for as many battles, to which that of maj.gen. was added, for a constant display of skill and courage. He retired from the service in 1869.

ROBINSON, Lucius, b. N. Y., 1810; commenced the practice of law 1832; master in chancery, 1843 and 1845; joined the republican party, was elected to the legislature 1859; comptroller of the state 1861, and again 1865; became the democratic candidate for the same office 1865, and was defeated; but was elected comptroller by the same party in 1875, and governor in 1876; was a candidate for re-election in 1879 and defeated.

ROBINSON, Solon, 1803–80; b. Tolland, Conn.; began his literary career by contributing to the *Albany Cultivator*, and was an industrious writer for agricultural journals. He was for some years agricultural editor of the *New York Tribune;* and was the author of *Hot Corn: Life Scenes in New York* (illustrated), which had a sale the first year of 50,000 copies. In 1860 he published *How to Live;* 1864, *Facts for Farmers.* In 1870 he removed to Jacksonville, Fla., and engaged in farming, contributing letters on southern agriculture to the *Daily Tribune* in 1879.

ROBINSON, Stuart, d.d.; b. Ireland, 1816; graduated at Amherst college in 1836; studied theology at the Union theological seminary at Prince Edward, Va.; was Presbyterian pastor in Baltimore 1852–56; professor of ecclesiology at Danville, Ky., 1856–58; in 1858 became pastor of the Second Presbyterian church, Louisville, Ky., which pastorate he resigned in 1881. He was strongly on the southern side in the rebellion. He has published *The Church of God; Discourses of Redemption; Discourses on the Pentateuch.* He edited in Baltimore, 1855–56, *The Presbyterial Critic*, and *The True Presbyterian*, in Louisville, Ky., which was suppressed by the government. In 1873 he visited Egypt and the Holy Land. He has ranked as the leading preacher in Louisville.

ROBINSON, Mrs. Therese Albertine Louise, wife of the preceding, and daughter of prof. von Jakob, known to the world of letters as "Talvi," a name composed of her initials, was born at Halle, Germany, Jan. 26, 1797. In 1807 she accompanied her father to Russia, where he had an appointment as professor in the university of Kharkov. In 1810 they removed to St. Petersburg, where she learned modern languages and history. In 1816 they returned to Halle, and there she studied Latin, and wrote a volume of tales, published in 1825 under the title of *Psyche;* and under the signature of "Ernest Berthold," translations of sir Walter Scott's *Black Dwarf* and *Old Mortality*, and also two volumes of Servian popular songs—*Volkslieder der Serben.* In 1828 she was married to prof. Robinson, and in 1830 accompanied him to America, where she studied the languages of the aborigines, translated Pickering's *Indian Tongues* into German, and contributed a *Historical View of the Languages and Literature of the Slavic Nations* to the *Biblical Repository.* In 1837 she accompanied her husband back to Germany, and published *An Essay on the Historical Characteristics of the Popular Songs of the German Nations, The Poems of Ossian not Genuine*, a *History of Captain John Smith*, in German, also *The Colonization of New England*, which was translated into English by the younger Hazlitt. Returning to New York, she wrote in English, *Heloise, or the Unrevealed Secret; Life's Discipline, a Tale of the Annals of Hungary; The Exiles;* and numerous contributions to German and American periodicals. She died at Hamburg in 1870.

ROBINSON, William E., b. Tyrone co., Ireland, 1814; having obtained a classical education came to this country in 1836, studied at Yale college, and graduated from the Yale law school. He was regular correspondent of the *New York Herald* 1838–44, and for the *Tribune* over the signature of *Richelieu* 1848–49. He edited *The People*, a weekly newspaper; practiced law in New York 1853–62, went to Europe in 1859; was U. S. assessor of internal revenue 1862; in congress 1867–69. He has published several fugitive poems, and delivered lectures, speeches, and addresses.

ROBISON, John, a celebrated Scotch natural philosopher, was b. at Boghall, in the parish of Baldernock, Stirlingshire, in 1739, and after a preliminary training at the grammar school of Glasgow, entered the university of that city in Nov., 1750, and took his degree in 1756. He was engaged to accompany Edward, duke of York, to sea, as his instructor in mathematics and navigation; but this arrangement being abandoned, Robison accompanied in a similar capacity the son of admiral Knowles (1758 to 1762). He afterward obtained the responsible office of taking charge of the Harrison (q.v.) chronometer in its trial trip across the Atlantic; and on his return (April 1763) from this expedition, for which he was never remunerated, he returned to Glasgow to commence the curriculum of divinity study. He happened, however, at this time to renew his acquaintance with James Watt and Dr. Black, and his former strong predilection for physical science underwent a vigorous revival, and was cultivated with such success that in 1766, when Black was transferred to the university of Edinburgh, Robison succeeded him. In 1770 his old friend, admiral Knowles, having been recommended by the British government to the czarina Catharine II. as the fittest person to reform the ship-building and naval administration of Russia, accepted the appointment of president of the Russian board of admiralty, and persuaded Robison to accompany him as secretary. Robison remained in Russia for several years, and rose high in the opinion of government, which conferred upon him various offices, both honorable and profitable. But the chair of natural philosophy in Edinburgh having become vacant in 1773, Robison was unanimously elected, and despite the extremely tempting and flattering offers of the Russian government, he accepted the chair (1774). On leaving Russia a pension was settled on him, and he agreed to take charge of two or three of the young cadets, his former pupils. To the performance of his professorial duties, Robison brought talents and acquirements of a high order; his knowledge was extensive, and included the latest discoveries of both British and foreign philosophers; his language was precise and fluent; and his views of his subject ingenious and comprehensive. But, on the other hand, his diction was too rapid, and he unfortunately disapproved of experiments, and employed them as little as possible in illustrating the great principles of natural science. In 1783 Robison joined with principal Robertson and other eminent men in reviving the old literary and scientific society (which had been founded in 1739 under the direction of Mr. Maclaurin, and had been in a languishing state since 1756), which was now incorporated by royal charter, and became the philosophical society. The *Transactions* of this society contain several works from Robison's pen, which are held in high esteem; and his contributions to the *Encyclopædia Britannica* were the means of elevating that work to the rank of a valuable and trustworthy book of reference. He published Black's *Lectures on Chemistry* (1803), and also a portion of a work of his own, entitled *Elements of Mechanical Philosophy*, which, together with some MSS. intended to form part of a second volume, etc., was re-published by sir David Brewster in 4 vols. (1822), with notes. On Jan. 28, 1805, he was seized with a severe recurrence of a former illness, brought on by a cold, and died two days afterward.

ROB ROY, the popular name of ROBERT M'GREGOR, a celebrated Scottish outlaw, whose singular adventures entitle him to be considered the Robin Hood of Scotland. He was b. between the years 1657 and 1660, and was the second son of Donald M'Gregor of Glengyle, by a daughter of Campbell of Glenlyon. Rob Roy, in consequence of the outlawry, in 1660, of the clan M'Gregor by the Scottish parliament, assumed the name of Campbell. In Gaelic, the name *Roy* signifies *red*, and was applied to him from his ruddy complexion and color of hair. Rob Roy received a fair education, and in his youth was distinguished for his skill in the use of the broadsword, in which the uncommon length of his arms was of much advantage. It was said that he could, without stooping, tie the garters of his Highland hose, which are placed two inches below the knee. Like many of the Highland proprietors of the period, Rob Roy dealt in grazing and rearing black-cattle for the English market. He took a tract of land for this purpose in Balquhidder; but his herds were so often stolen by banditti from Inverness, Ross, and Sutherland, that, to protect himself, he had to maintain a party of armed men, to which may be attributed the warlike habits he afterward acquired. He also protected his neighbors' flocks, in return for which he levied a tax, which went under the name of "black mail." Rob Roy married a daughter of the laird of Glenfalloch, shortly after which he acquired the estates of Craig Royston and Inversnaid, near the head of Loch Lomond. In consequence of losses incurred in unsuccessful speculations in cattle, for which he had borrowed money from the duke of Montrose, Rob Roy lost his estates, which were seized by the duke, on account of this debt. Rob Roy rendered desperate by his misfortunes, collected a band of about twenty followers, and made open war upon the duke, sweeping away the whole cattle of a district, and intercepting the rents of his tenants. That this could happen at so late a period, and in the immediate neighborhood of the garrisons of Stirling, Dumbarton, and Glasgow, appears almost incredible; but Rob Roy enjoyed the protection of the duke of Argyle and the respect of the country people, who gave him timely information of the designs of his enemies. Numberless stories are still current in the neighborhood of Loch Lomond and Loch Katrine of his hairbreadth escapes from capture by the troops. At one time, a reward of £1000 was offered for his head, in consequence of which he was obliged to take shelter in a cave at the base of Ben Lomond, on the banks of the lake, which had in former times afforded a secure retreat to Robert the Bruce. Many instances have also been recorded of his kindness to the poor, whose wants he often supplied at the expense of the rich. Rob Roy was not the commonplace *cateran* that many people think him. He gave his sons a good education, and died peaceably in his bed about the year 1738. His funeral was attended by all the people of the district, with the exception of the partisans of his enemy, the duke of Montrose. Rob Roy's exploits have been immortalized by sir Walter Scott in his celebrated novel of *Rob Roy*, written in 1817.

A circumstance little known in connection with Rob Roy's literary tastes is, that in the list of subscribers to Keith's *History of the Affairs of Church and State in Scotland*, published in 1734, there occurs the name "Robert Macgregor, *alias* Rob Roy."

ROC, or Rock, a fabulous bird, represented as of immense size, and "able to truss an elephant" in its talons. It is perhaps enough to refer to the *Arabian Nights' Entertainments* as to the size and power of the roc. A belief in its existence prevailed throughout the middle ages, and it is noticed in many works of that period. The fables concerning the roc may have originated in exaggerated stories of some of the great eagles, or of the Lammergeier.

ROCAMBOLE, *Allium scorodoprasum*, a plant of the same genus with garlic, onion, leek, etc., and nearly allied to garlic, which it resembles in its habit, although larger in all its parts. The upper part of the stem is in general spirally twisted before flowering. The root forms rounder cloves than those of garlic, and of much milder flavor; the umbels are also bulbiferous. Rocambole has long been cultivated in kitchen gardens, although it has never become very common in them. It is a native of sandy soils in Denmark and other countries near the Baltic.

ROCCELLA. See Archil.

ROCH or Rock Alum, a name formerly given to pure alum in mass; but it is now applied to a particular variety found at Civita Vecchia, in the Roman states. It is a kind of native alum, free from iron, but having a reddish color, derived from the soil in which it is found. It is also called Roman, and red alum. A factitious kind is now in general use, made of common alum reddened with Armenian bole.

ROCHAMBEAU, Jean Baptiste Donatien de VIMEUR, Comte de, 1725–1807; a French general, early promoted for skill in military maneuvers, distinguished at the siege of Maestricht in 1748, and in many subsequent battles. In 1780, with the rank of lieut.gen., he was at the head of the expedition of 6,000 French soldiers sent to the assistance of the Americans under Washington. The union of the French with the American forces accomplished the surrender of the British forces in Yorktown, and virtually closed the revolutionary war. Congress voted the thanks of the nation to France, Rochambeau, and his troops; and presented him with cannon captured at Yorktown. In 1783 he was made governor of Picardy and Artois, and in 1791 marshal. He sympathized with the early work of the French revolution and served as commander of the army of the north under Demouriez, but retired to private life after the execution of Louis XVI; was suspected by the Robespierre faction and imprisoned, escaping the guillotine by the fall of the dictator in 1798. He was then released, and when Napoleon came to power was restored to his rank and former position. His memoirs in 2 vols. were published in 1809 and translated in 1838.

ROCHDALE, a thriving manufacturing t. of Lancashire, a market-town and parliamentary and municipal borough, in the valley of the Roche, and built on both sides of that stream, 11 m. n.n.e. of Manchester, and 200 m. n.w. of London by railway. The parish church, placed on an eminence, and approached by a flight of steps, is a venerable edifice, dating from the 12th c., and built partly in late Norman, and partly in perpendicular. The other public buildings comprise churches, chapels, and meeting-houses for the various dissenting sects. The new town-hall, completed in 1867, is a fine building in domestic Gothic style. The public baths, opened in 1868, are the property of the corporation. Many improvements in the architectural and sanitary condition of the town have been made within recent years. With all the improvements, however, Rochdale is beautiful only in site, and derives its importance wholly from its extensive and varied manufactures. The woolen manufacture, introduced here by a colony of Flemings in the reign of Edward III., is in a prosperous state, and is increasing in importance. Blankets, baizes, kerseys, and other woolen fabrics are the staple manufactures. Cotton goods also, especially calicoes, are largely manufactured. In the vicinity, coal is found, and flagstones, freestones, and slates are abundantly quarried. A good general trade is carried on; there are several hat-factories, cotton-mills, machine-shops, iron and brass foundries, etc. There are weekly markets for woolen goods and grain, and fortnightly fairs for cattle. The commerce of the town is facilitated by abundant means of communication. Pop. '71, of municipal borough, 44,559. Rochdale returns one member to the house of commons.

ROCHEFORT-LUCAY, Victor Henri, Comte de; b. Paris, 1830; of a distinguished family, some of whom had been chancellors of France. His father was a pronounced royalist; but his mother, a radical sympathizer with political progress of all kinds, educated Henri to abhor caste under whatever guise. He was a timid youth of feeble health but of rare nervous and mental power. Soon after his graduation he became the sole support of his mother and three sisters, finding employment in a government office in 1851. At this time he was engaged to write theatrical criticisms for the *Charivari*, where he made himself felt by the vigor of his style, and became a favorite by his brilliant social qualities and wit free from malice. In 1860 baron Hausemann procured him an appointment and an improved salary. In 1863 he became one of the editors of the *Figaro*, where his style was recognized as that of an editorial master and he signed his articles with his full name. In 1866 he began those rigorous thrusts at the Napoleonic government which caused the paper to be interdicted until the publisher dropped Rochefort from its editorial staff. He then collected his political articles and published them in volumes entitled *Français de la Décadence* in 1866, *La Grande Bohème*, 1867, and *Signes du Temps*, 1868. The repeal of the most arbitrary restrictions on the press in 1868 enabled Rochefort to start a journal of his own called the *Lanterne*, a weekly which soon obtained an immense circulation, and brought the government's friends to his attack by law, by defamation, and by personal violence. The 11th number was seized, the editor arrested and convicted of disrespect of the government, sentenced to a year in prison, a fine of 10,000 francs, and deprivation of civil and political rights. He escaped to Brussels, continued the publication of the *Lanterne* there; and spite of the most rigorous police exclusion it was largely read in France; and by translations made into English, German, and Italian papers its articles came into France in a thousand ways. In 1869 a district in Paris nominated him for the legislative assembly, when Jules Grévy was elected. The same year he was permitted to return to Paris by discontinuing the *Lanterne*, when he was elected to the assembly and took his seat Dec., 1869. He there exhibited his disposition to overthrow the government; started the *Marseillaise*, in a similar style to the *Lanterne*, and attracted the animosity that led Pierre Bonaparte to murder his associate editor Victor Noir. For editorials immediately following this outrage he was again sent to prison, but permitted to appear as a witness at the trial of Pierre Bonaparte, where his testimony was given with an unexpected moderation of language. On the break-up of the imperial government following the French defeats in 1870, Rochefort gained his liberty and became a member of the provisional government. After the capitulation of Paris, Jan., 1871, he founded the *Mot d'Ordre*, which defended Gambetta's policy. Elected to the national assembly at Bordeaux, he remarked that "this time the republicans shall not be juggled out of the republic." He imagined Thiers not friendly to a republic; and finding his influence, and that of persons still less friendly, predominating, he resumed the direction of his journal in Paris and threw himself into the movement to organize in the capital a government opposed to that in Versailles. The organizers of that government had no sympathy with the wild spirit of destructiveness which ruled in Paris after its defeat, but they were held responsible for the consequences. After the surrender of Paris to the national troops, Rochefort was tried and condemned for his action, sent to prison, and two years later sent to the penal colony of New Caledonia in the Pacific. He escaped with friends in 1874, returned via San Francisco, New York, and London, and revived the *Lanterne* in Geneva, Switzerland. The general amnesty of July 11, 1880, permitted his return to Paris, where he has established a journal named *L'Intransigeant*.

ROCHEFORT-SUR-MER, an important sea-port and naval arsenal of France, in the dep. of Charente-Inférieure, stands on the right bank of the Charente, 5 m. from its mouth. It is surrounded by ramparts, and protected by forts at the mouth of the river; and is a modern, clean, well-built town. Few French towns can be compared with Rochefort-sur-Mer for the number and importance of its public works. The harbor, which is one of the three largest in France, is deep enough to float large vessels at low water. Rochefort-sur-Mer has fine wharfs, extensive magazines, dock-yards, rope-walks, cannon foundries, and other establishments designed for the manufacture and preservation of naval stores and marine apparatus of every kind, including extensive bread and biscuit stores. The most celebrated of its many institutions are the marine hospital, founded in 1787, and provided with 1240 beds for seamen, besides wards for invalided officers; the artillery and naval schools for every branch of the profession, and the general civil college. Its convict-prison, which had accommodation for 1000 prisoners, has been disused since 1852, and the convicts are now transported to Cayenne. In addition to the extensive trade arising from the special character of the place, Rochefort-sur-Mer is the center of the commerce of the department, and is largely engaged in colonial trade, in the manufacture of brandy, and in the building of men-of-war and merchant-ships, steamers, and coasting vessels. Pop. '76, 25,454.

ROCHEFOUCAULD, an old French family of great celebrity, whose original seat was the small town of Larochefoucauld, near Angoulême. The history of the family is traced back to 1026, when a certain Foucauld, first seigneur de la Roche, is spoken of in a charter of an abbey of Angoulême as *vir nobilissimus Fulcaudus*. In the religious wars of the 16th c., it embraced the cause of the Protestants. FRANÇOIS, DUC DE L., and PRINCE DE MARSILLAC, born 1613, was much attached to literary pursuits; and after having been involved in intrigues against cardinal Richelieu, and in the tumults of the Fronde, he retired into private life, cultivated the society of the most eminent literary persons of his time, Boileau, Racine, and Molière, and composed his famous *Mémoires* (Cologne, 1662; Amst. 1723, etc.), in which he gives a simple but masterly historic account of the political events of his time. In 1665 he published also his *Réflexions ou Sentences et Maximes Morales*, a work containing 360 detached thoughts, of which, perhaps, the most widely celebrated is his definition of hypocrisy, as "the homage which vice renders to virtue." The book is regarded as a model of French prose, and exhibits much acuteness of observation, and a clear perception of the prevalent corruption and hypocrisy of his time. He died Mar. 17, 1680. His *Œuvres Complètes* were edited by Depping (Par. 1818), and his writings have been commented on by a host of critics of the most different schools, as Voltaire, Vinet, Sainte-Beuve, and Victor Cousin.—FRANÇOIS ALEXANDRE FRÉDÉRIC, DUC DE L.-LIANCOURT, an eminent philanthropist, born Jan. 11, 1747, was representative of the nobles of Clermont in the states-general, and was a zealous advocate of reform, but sought to preserve the monarchy. After the catastrophe of Aug. 10, he fled to England, and lived in great penury, till he obtained back, in 1794, some fragments of his property. He now visited North America, and afterward published his *Voyage dans les Etats-Unis d'Amerique fait en* 1795-97 (8 vols. Par. 1798). Having returned to Paris, he lived for some time in retirement, occupied only with the extension of vaccination and similar works of benevolence. Napoleon restored him his ducal title in 1809. After the restoration, he was made a peer, but soon gave offense to the court, by opposing its unconstitutional policy. He labored zealously in promotion of many patriotic and philanthropic objects. He founded the first savings bank in France. He died Mar. 27, 1827.

ROCHELLE. See LA ROCHELLE.

ROCHELLE SALT is the popular name of the tartrate of soda and potash ($NaO,KO,C_8H_4O_{10} + 8 Aq$), this salt having been discovered, in 1672, by a Rochelle apothecary named Seignette. It occurs, when pure, in colorless transparent prisms, generally eight-sided; and in taste it resembles common salt. It is prepared by neutralizing acid tartrate of potash (formerly known as bitartrate) with carbonate of soda. After a neutral solution has been obtained, it must be boiled and filtered, and the resulting fluid must be concentrated till a pellicle forms on the surface, when it must be set aside to crystalize.

This salt is a mild and efficient laxative, and is less disagreeable to the taste than most of the saline purgatives. From half an ounce to an ounce, dissolved in eight or ten parts of water, forms an average dose. A dram of Rochelle salt added to one of the ingredients of an effervescing draught (bicarbonate of soda or tartaric acid, for example), forms one of the varieties of what are called seidlitz powders.

ROCHESTER, a city the co. seat of Olmsted co., Minn., on the Zumbro river, and the Winona and St. Paul railroad; pop. '70, 4,344. It has a court-house, a public library, churches, newspapers, hotels, foundries, machine shops, manufactories of furniture, wagons, etc.

ROCHESTER, a city of New York, is on the Genesee river, 7 m. s. of its entrance into lake Ontario, where it is crossed by the Erie canal and the Central railway, and is the terminus of the Genesee Valley canal and railway, 229 m. w.n.w. of Albany. In the center of the city are the upper falls of the Genesee, a perpendicular cataract of 96 feet. Two other falls of 84 and 25 ft. are a mile and a half below, the river running through a deep gorge in its limestone banks, from 100 to 220 ft. high. The city is well built, chiefly of bluish limestone, with broad shaded streets, and there are nearly as many houses as families. The falls give water-power to numerous large flour-mills and other manufactories. The canal crosses the river on a handsome aqueduct of seven arches. There are 57 churches, 20 public schools, 41 academies, a university, theological seminary, atheneum, Protestant and Catholic hospitals, a reformatory and county offices, 5 banks and 4 savings banks, with 10,000,000 dollars on deposit, 4 daily and 10 other papers. The rural cemetery of Mount Hope is one of the ornaments of the city. The suburbs are highly cultivated, having 4,000 acres of fruit-trees, and nurseries of 250 to 500 acres. The nursery trade of Rochester is not surpassed by that of any other place in the world There is a good harbor at the mouth of the river, and a considerable commerce by the lake. Rochester was settled in 1810; in 1820 its population was 1502; in 1840, 20,191; in 1860, 48,243; in 1870, 62,386; in 1875, 81,813.

ROCHESTER (*ante*) became an incorporated village in 1817 and took its name from Nathaniel Rochester, an American pioneer, who first laid it out. In 1834 it received its charter as a city, and has since steadily prospered. By the census of 1880 the population was 89,363, an increase of 7,550 since 1875. The great water-power furnished by the Genesee river, together with the facilities for transportation and the fertility of the surrounding country, has contributed to its growth. It is the county seat of Monroe co. and is situated on both sides of the Genesee, which divides it into almost equal parts. The site is elevated, covers an area of about 17 sq.m., and is laid out chiefly in squares with streets generally shaded and from 60 to 100 ft. in width. The principal business thoroughfare, Main street, is in the center and crosses the river over a handsome bridge. Among the chief buildings are the city hall, of blue limestone, with a tower 175 ft. high; the county court-house; the free academy, or high-school building; the Powers building, used for business purposes; and the Rochester savings bank. The manufactures are extensive and varied. In earlier years flour was the chief product, and, although now dwarfed by other industries, it is still of importance, there being 18 mills, grinding annually 2,500,000 bushels of wheat. The largest industry, however, is the manufacture of ready-made clothing, which uses a capital of $2,500,000, employs 6,500 hands, and produces goods annually valued at $5,500,000. The manufacture of boots and shoes ranks next, for which about $1,250,000 are used as capital. The Leighton iron bridge works employ 300 men, and produce material yearly valued at $1,000,000. Other manufactories in the city are the Stewart rubber company, 18 breweries, 5 tobacco factories, and 1 carriage factory. The nursery business yields an average yearly product of about $1,000,000. The foreign commerce of the city is carried on chiefly by the lakes, though some of it goes and comes by way of New York. In 1875 the exports amounted to

$784,979; the imports to $331,609. A net-work of railroads affords advantages for transportation. The city is divided into 16 wards, and is governed by a mayor and a common council consisting of two aldermen from each ward. The board of education consists of one commissioner from each ward, chosen by the people every three years. The assessed valuation of property in 1875 was $61,351,700, which is believed to be only about three-fourths of the real value. In March of the year mentioned the city debt amounted to $5,000,000, and the city owned property, exclusive of its expensive water-works, valued at $2,000,000. The public schools employ about 180 teachers, and usually have enrolled as many as 11,000 pupils. The university of Rochester was established in 1850 by the Baptists. It is situated in the eastern part of the city, where it possesses 23 acres of ground, handsomely laid out, and occupies large buildings of dark-red sandstone. The religious denominations of the city are 5 Baptist, 1 Christadelphian, 1 Congregational, 7 Episcopal, 5 German Evangelical, 2 Friends, 2 Jewish, 2 Lutheran, 9 Methodist, 10 Presbyterian, 1 Reformed Church in America, 11 Roman Catholic, 1 Second Advent, 1 Unitarian, and 1 Universalist.

ROCHESTER, an episcopal city, parliamentary and municipal borough and river-port of Kent, stands between Chatham (q. v.) on the e., and Strood on the n.w., on the right bank of the Medway, 36 m. e.s.e. of London, by the London, Chatham, and Dover railway. Together with Chatham and Strood, it forms in effect one large town. The city is surrounded on two sides by the river; and its ancient castle and cathedral, the numerous martello towers along its shores, and the works connected with the Chatham lines of fortification, render its appearance highly striking. The bishopric of Rochester was founded in 604; but the early Saxon cathedral suffered from the ravages of the Danes, and was in a completely ruined condition at the time of the Norman conquest. Gundulf, who was consecrated bishop of Rochester in 1077, began to rebuild the cathedral and the priory connected with it; the dormitory, chapter-house, and refectory were added under the succeeding bishop; and the new cathedral was dedicated in 1130, in presence of the king and a great company of bishops. The cathedral, the nave and crypt of which are Norman, and the choir and transepts early English, is 310 ft. long, and the western transept is 123 ft., and the nave and choir 68 ft. broad. Of the ancient Norman priory, only a small fragment remains. The castle, crowning an eminence, and overlooking the cathedral, is a Norman keep, built in a wonderfully strong and solid style of masonry. Rochester imports coal and exports hops. In 1875, 4,138 vessels, of 493,575 tons, entered the port, and 3,151, of 217,260 tons, cleared. Rochester returns two members to the house of commons. Pop. '61, 16,862; '71, 18,352.

Rochester, which is surmised to have existed prior to the Roman invasion, was called by the Romans *Durobrivæ*, and, according to Bede, derives its present name (*Hrofs-ceaster*, Hrof's castle) from that of Hrof, a Saxon chieftain.

ROCHESTER, JOHN WILMOT, second Earl of, has left a name notorious for wit and profligacy. He was b. April 10, 1647, at Ditchley, Oxfordshire, his father being Henry, first earl, better known as the lord Wilmot of Clarendon's *History*. He was entered of Wadham college, Oxford, when only 12 years of age; and at 14 was, with other persons of rank, made M.A. by lord Clarendon in person. After traveling in France and Italy, he attached himself to the court, and rose high in favor with Charles II., who made him one of the gentlemen of the bedchamber, and comptroller of Woodstock park. In 1665 he went to sea in the fleet commanded by the earl of Sandwich, and behaved at Bergen with great intrepidity. His account of the attack is described in a letter to his mother given in Wordsworth's *Ecclesiastical Biography*. He had entered into a formal engagement with his friend Mr. Windham, "not without the ceremonies of religion, that if either of them died, he should appear, and give the other notice of the future state, if there was any." Windham was killed in the action, but did not afterward disturb the repose of his friend. Rochester incurred the displeasure of the king, and was committed to the tower, for the forcible abduction of a celebrated beauty and heiress, Miss Mallett, who was rescued by her friends, but whom he subsequently married before he was 20 years old. His wit and love of pleasure made him the favorite of a dissolute court. He once harangued the populace as a mountebank from a stage on Tower hill, and is said to have occasionally persuaded the "merry monarch" to disguise his rank, and accompany him in the pursuit of frolic and adventure. His genius and activity of mind led him to withdraw at times from scenes of gallantry and licentious merriment. He cultivated the muses with success, and Anthony Wood speaks of him as the greatest scholar among the nobility of his day. As he grew older, he gave less of his time to study, and more to the company of vicious companions, and indulgence in wine. His constitution being undermined by excess and voluptuousness, he died at the early age of 34. Bishop Burnet has left an interesting account of his death under the title of *Some Passages of the Life and Death of John Earl of Rochester*, from which it appears that he became a sincere convert to the truth of Christianity, and sincerely repented his immoral and dissolute courses. He wrote some love-songs, an elegant *Imitation of Horace on Lucilius*, a *Satire against Man*, in which he is much indebted to Boileau, and an *Essay on Nothing*, which is perhaps his best performance.

ROCHESTER, NATHANIEL, 1752–1831; b. Va.; merchant at Hillsboro, N. C.; maj. and commiss.gen. in the revolutionary war. He led the forces which captured the

British gen. McDonald and his regiment of Scots at Wilmington. He was a member of the convention which framed the constitution of North Carolina. Subsequently he removed to Maryland and engaged in manufacturing at Hagarstown. In 1800 he became the owner of large tracts of land on the banks of the Genesee river, and settled in Rochester, N. Y., which was named in his honor.

ROCHESTER, UNIVERSITY OF, in the city of Rochester, N. Y.; a Baptist institution, established in 1850. It discarded the dormitory system from the beginning, and exercises no watch over students out of recitation hours. Its grounds, which are beautifully laid out, are in the eastern part of the city, and the university building is a massive structure of dark red sandstone, 150 ft. long, 80 ft. wide, and three stories high. It has an invested fund of $212,000, and real estate valued at $378,000. The library, for which a fire-proof building is provided, contains 11,500 volumes, and the geological cabinets are among the best in the country. Three courses of study are open to students—the classical, the scientific, and the eclectic. Professors in 1878, 9; students, 146. Martin B. Anderson, LL.D., president.

RO'CHET (Lat. *rochetus*, or *rochettus*), a portion of the church costume of bishops, abbots, prelates, canons of certain privileged chapters, and some other dignitaries. It is usually of lawn or lace, and is of the form of a surplice, but with close-fitting sleeves. In the Latin church its use is very ancient, although its form has varied at different times. In the first prayer-book of Edward VI., which preserved a considerable part of the Roman episcopal costume, the rochet was ordered to be worn by bishops in the communion service. The rochet, however, must not be confounded, as is often done by writers on clerical costume, with the dalmatic and tunic, tight and close-fitting vestments of colored silk, worn by bishops under the *planeta* (q.v.).

ROCHETTE, DÉSIRÉ RAOUL, 1790–1854; b. and educated at Bourges; in Paris, at the age of 21, he assisted Guizot in the professorship of modern history in 1815; editor of the *Journal des Savans* in 1816, and in various government service until 1828, when he was a member of the scientific commission to the Morea. His *Lectures on Ancient Art*, translated into English, were published in London, 1854.

ROCK. Though popularly restricted to masses of indurated matter, this term is extended by geologists to all substances which make up the crust of the earth, whether they be loose and friable like soil and sand, or compact and indurated like limestone and granite. The rocks of the earth's crust will be found described under the heads AQUEOUS and IGNEOUS ROCKS, to which the reader is referred.

ROCK, a kind of sweetmeat, made of sugar, sometimes mixed with almonds and various flavoring materials. The sugar is first boiled, and then poured out upon a cold marble slab, and worked up into a rough mass.—The term is also frequently applied to another form of sweetmeat, in which the sugar, whilst hot and soft, is pulled repeatedly over a smooth iron hook, until it becomes white and porous. This is also flavored with peppermint or other essences.

ROCK, a co. in s.w. Minnesota, adjoining Iowa, watered by Rock river, and Channarambe and Beaver creeks, on a branch of the Sioux City and St. Paul railroad; about 475 sq.m.; pop. '80, 3,669—2,654 of American birth. The surface is rolling. The soil is fertile. The principal productions are wheat, corn, grass, oats, and live stock. Co. seat, Luverne.

ROCK, a s. co. in Wisconsin, bordering on Illinois; crossed by the Chicago and Northwestern, the Western Union, and the Milwaukee and St. Paul railroads. It is drained by Turtle and Sugar creeks, and by Rock river, which runs through the center and divides the county; 700 sq.m.; pop. '80, 38,823. The surface is mostly level, and abounds in rich prairie land—that lying e. of the river being known as Rock prairie. The soil is fertile, and tobacco, hops, wool, grain, and honey are the principal products; horses, sheep, cattle, and swine are raised in great numbers. It contains numerous manufactories of agricultural implements, machinery, furniture, carriages and wagons, also flour mills. The county has some fine scenery, and hard wood is abundant. Co. seat, Janesville.

ROCKALL stands on a sand-bank in the north Atlantic ocean; this bank is nearly 100 m. in length, and 40 in breadth. The rock itself is situate in 57° 35′ n. lat., 13° 40′ w. long., about 300 m. w. of north Uist, in the outer Hebrides, and is of a rounded form, rising about 18 or 20 ft. above the sea. It is frequented by large flocks of sea-birds, and the place was found some years ago to be surrounded by considerable shoals of the larger kinds of fish, chiefly *gadidæ* and *pluronectidæ*. A company was formed in 1861 to carry on a fishery at the place; but the supply not proving so great as was anticipated, and the distance from the markets being very considerable, the speculation proved to be very unprofitable. There are still a few fish about Rockall, but they are caught by private fishermen.

ROCKBRIDGE, a co. of w. Virginia, bounded by the Blue Ridge on the s.e., forms a part of the great valley of Virginia. It is intersected by the Chesapeake and Ohio railroad; and drained by the North, South, Calf Pasture, and James rivers; 700 sq.m.; pop. '80, 20,003. The surface is mountainous, with forests of maple, chestnut, oak, and tulip trees. The soil is very fertile; main productions are corn, wheat, oats, hay, wool, tobacco, and sorghum. It contains manufactories of tin, copper, and sheet-iron ware, and tanneries for tanned and curried leather, and numerous flour mills. The county derives its name from a natural arch formed of rocks, in the southern part, which rises some 200 ft., and spans Cedar creek. The James River canal passes through the southern part. Co. seat, Lexington.

ROCK BUTTER, a mineral substance, consisting of alum (q.v.), mixed with alumina and oxide of iron, of a pasty consistency, and appearing as an exudation oozing out of rocks which contain alum. It is always greasy to the touch, but is often hard enough to exhibit a straight foliated fracture. It is very easily broken. It occurs in most of the places where alum is procured.

ROCK CASTLE, a co. in s.e. central Kentucky; drained by the Rock Castle and Dick's rivers; traversed by the Louisville and Great Southern railroad; 280 sq.m.; pop. '80, 9,670—9,629 of American birth, 437 colored. The surface is uneven and heavily wooded; corn, grass, oats, and pork are the staples. Bituminous coal is found. Co. seat, Mount Vernon.

ROCK, COCK OF THE, *Rupicola aurantia*, a bird of the order *insessores;* tribe *dentirostres;* family *pipridæ* (manakins, etc.), regarded by many as a sub-family of *ampelidæ*. The *pipridæ*, or manakins, are a pretty large group of birds, many of them of very curious and beautiful plumage, most of them inhabitants of America, and only of the tropical parts of it. They have the bill broad at the base, the nostrils at the side nearly hidden by feathers; the wings rather short, but pointed; the tail very short and even; the legs (*tarsi*) long and slender. In the genus *rupicola*, the bill is strong; and the species sometimes called *rock-manakins* are comparatively large birds, having a double vertical crest on the head, with the feathers disposed in a fan-like manner. The cock of the rock is a native of Guiana and of other north-eastern parts of South America. It is remarkable for its bright orange-colored plumage—the quill-feathers of the wings, however, being black, and the tail tipped with yellow—its large crest overhanging the bill, and its wary habits. It is a solitary bird, inhabiting rocky places, retiring into a hiding-place during the day, and coming forth to feed at sunrise and sunset. The tips of the crest-feathers are tinged with brown and yellow. The wing-coverts and upper tail-coverts are loose flowing plumes, giving a resemblance to gallinaceous birds. The size is about that of a common pigeon.—The Peruvian cock of the rock (*R. Peruviana*) is less brilliant in plumage than the Guiana species.

ROCK CRYSTAL, a popular and partly also a scientific name for the finest and purest quartz (q.v.), seldom applied, however, to small crystals which are mere six-sided pyramids, but more generally to those in which the six-sided prism is well developed. The name is sometimes limited to colorless and perfectly transparent quartz, but is also more rarely extended to that which is violet or amethystine (*amethyst*, q.v.), red (*Bohemian ruby* or *Silesian ruby*), wine-yellow (*citrin* or *gold topaz*), brown or smoky (*smoke quartz, Cairngorm stone*), etc. The beauty of specimens of rock crystal is sometimes very great. The crystals are sometimes slender, crossing and penetrating each other in exquisite groups. They sometimes inclose other substances, which are beautifully seen through the transparent rock crystal, as slender hair-like or needle-like crystals of hornblende, asbestus, oxide of iron, rutile or oxide of titanium, oxide of manganese, etc., and such specimens are known by various fanciful names, as *Thetis's hair-stone, Venus's hair-stone, Venus's pencils, Cupid's net, Cupid's arrows*, etc.; and sometimes the inclosed substances are small spangles of iron-glance, or crystals of iron pyrites, or native silver in fern-like leaves, or spangles of gold. Very large crystals of perfectly pure rock crystal are sometimes found. One found in the Alps, and which was among the treasures carried from Italy by the French in 1797, is 3 ft. in diameter, and weighs 8 cwt. Rock crystal was prized by the ancients, and was used by them, as it still is, for vases, cups, seals, etc. An important modern use of it is for lenses of spectacles, etc., its hardness rendering it much less liable to be scratched than glass. Lenses of rock crystal are often called *pebble* lenses.

ROCKDALE, a co. in n. central Georgia; drained by the Ocmulgee river; traversed by the Georgia railroad; 180 sq.m.; pop. '80, 6,838—6,829 of American birth, 2,688 colored. The surface is uneven and not very fertile. The county was formed within the last ten years. Gold and iron are found in small quantities. Co. seat, Conyers.

ROCKET, a name given to a number of plants of the natural order *cruciferæ* and belonging to the genera *brassica, sisymbrium, erysimum, barbarea, hesperis*, etc.—Garden Rocket (*brassica eruca*, or *eruca sativa*) is an annual plant, a native of Austria, with stem 2 ft. high, upright and branching; the leaves smooth, succulent, cut, and toothed. When in flower, it has a strong, peculiar, and disagreeable smell; but when it is very young, this smell is almost imperceptible, and the leaves are used as a salad, for which it is frequently sown on the continent of Europe, and was formerly cultivated also in Britain.—The name Garden Rocket is also given to *hesperis matronalis*, also called Dame's violet (q.v.), a favorite ornament of our flower-border.—The Yellow Rocket of our flower-borders is a double-flowered variety of *barbarea vulgaris* (see Cress).—

The Wild Rocket (*sisymbrium officinale*, or *erysimum officinale*) is common in Britain, and is sometimes sown and used as a spring pot-herb.

ROCKET is a firearm capable of taking effect at a long range. The rocket consists of a light tubular case of pasteboard, or thin metal, charged to the muzzle with a composition consisting of saltpeter 68 parts, sulphur 12 parts, charcoal or mealed powder 32 parts. This composition is rammed hard into the case, the center being left void. To the rocket is attached a long stick, which serves (like the tail of a kite) to straighten its course. See Pyrotechny. When lighted at the end the stream of gases propels the mass on the principle explained under Barker's Mill. As a mere firework, rockets are made of a few ounces in weight: as intended to throw light upon a town or a hostile work, they average from ½ lb. to 2 lb. These light rockets were improved by sir William Congreve, who so contrived them, that, when over the necessary point the rocket discharged a number of light balls, which burned in the air for several minutes with great brilliancy, while others at the same point released small parachutes, which sustained a bright light for a still longer time. But sir William Congreve did more: he converted the rocket into a terrible weapon of war, with ranges which no ordnance of that day could attain. Discarding the small sizes, he made 12-lb., 18-lb., and 32-lb. rockets, which he charged with canister-shot, bullets, and other missiles. The stick for a 32-lb. rocket is 18 ft. in length, and the maximum range 3,500 yards. The range can be also increased by discharging the rocket from a cannon, with a time-fuse to ignite it at the cannon's utmost range, when the rocket commences its own course. As missiles, these rockets are found to annoy most seriously the defenders in any fortified work, and, in a bombardment, they speedily set houses and buildings on fire. In the field, also, the plunging, ricochetting motion of the rocket greatly disturbs both cavalry and infantry. The Congreve rockets were first tried on actual service, and with fatal effect, at the attack on Copenhagen in 1807. One great advantage in a rocket is, that it has no recoil against the stand from which it is fired; the largest rocket may therefore be discharged without danger from the smallest boat; consequently, in naval attacks on maritime fortresses, a flotilla of rocket-boats is a very common auxiliary. For the use of rockets in shipwrecks, see Life Mortars and Rockets.

ROCK-FISH. See Wrasse.

ROCKFORD, a city of Illinois, on the Rock river, 92 m. w.n.w. of Chicago, on the Chicago and Galena railway. It is the center of a rich country, with county buildings, 6 banks, 5 newspapers, 16 churches, and factories supplied with water-power by the river. Pop. '70, 11,049.

ROCKFORD (*ante*), a city in n. Illinois, incorporated 1852; called the "forest city;" pop. '80, 13,088. It is on the Freeport line of the Chicago and Northwestern railroad, the termini of the Kenosha and Rockford branch, and the Chicago and Iowa railroads. It is lighted by gas, has many fine residences, and is supplied with water by the Holly system, at a cost of $225,000. The water-works are supplied from springs, and the water is raised by machinery which pumps 3,000,000 galls. of water in 24 hours, running at the rate of 39 revolutions per minute, through 21 m. of pipe. The river is here crossed by a handsome iron bridge, and the Rockford Hydraulic company have built a dam across it 800 ft. long. It has 6 banks—4 national, 1 state, and a private bank, with deposits amounting to $1,350,000. It has public schools; the Rockford seminary for girls, founded 1849; a fine museum and collection of stuffed birds, coins, precious stones, and geological specimens; a public library of 10,000 vols.; a monthly magazine; and 8 insurance companies. Its manufactures are important; embracing as leading industries the manufacture of reapers, mowers, paper, flour, cotton batting, seamless bags, and yarn, furniture, woolen goods, malleable iron, pumps, etc. Among the manufactories is a watch factory, with a capital of $150,000, an oatmeal factory, and works for machine and mill casting.

ROCKINGHAM, a co. in extreme s.e. New Hampshire, adjoining Massachusetts; bounded e. by the Atlantic; drained by the Lamprey and Piscataqua rivers; intersected by the Boston and Maine, the Concord and Portsmouth, and the Manchester and Lawrence railroads; 700 sq.m.; pop. '80, 49,062—45,118 of American birth. The surface is rugged and fairly fertile; corn, potatoes, wheat, hay, dairy products, and maple sugar, are the staples. Co. seats, Portsmouth and Exeter.

ROCKINGHAM, a n. co. of North Carolina, on the Virginia border, intersected by the Richmond and Danville railroad; drained by the Dan and Haw rivers; 600 sq.m.; pop. '80, 21,744. The surface is undulating, and partly covered with forests; the soil is fertile. The principal productions are corn, tobacco, sweet potatoes, honey, butter, and cattle. It contains 12 manufactories of chewing tobacco. Co. seat, Wentworth.

ROCKINGHAM, a co. in n.w. Virginia; drained by the Shenandoah and its branches: traversed by a branch of the Baltimore and Ohio railroad; 750 sq.m.; pop. '80, 29,567—29,368 of American birth; 3,430 colored. The county lies in a valley, and on the s.e. slope of the Blue Ridge mountains; the soil is very rich; tobacco, corn, wheat, oats, and pork are the staples. Co. seat, Harrisonburg.

ROCKINGHAM, Charles Watson WENTWORTH, Marquis of, 1730–82; created earl of Malton in the Irish peerage in 1750. He immediately entered the house of lords.

He was a constitutional whig, and though not a man of marked talent had a great political influence on account of his wealth, his family connection, and his known moderation. He was first lord of the treasury and prime-minister 1765–66, and again from the resignation of lord North in 1782 till his own death. Under his administration the stamp act was repealed; the repeal being joined to an act asserting the power of parliament over the colonies.

ROCKING-STONES, or LOGGANS, are large masses of rock so finely poised as to move backward and forward with the slightest impulse. They occur in nearly every country. Some of them appear to be natural, others artificial; the latter seem to have been formed by cutting away a mass of rock round the center-point of its base. The former are chiefly granitic rocks, in which feldspar and porphyry are abundantly present; and these ingredients becoming rapidly decomposed, and the dust and sand washed away by rains, what was formerly a solid rock, soon assumes the appearance of a group of irregularly-shaped pillars, having a rhomboidal horizontal section, and separated into portions by horizontal and vertical fissures. As decay proceeds, the edges of the blocks forming the pillar are first attacked and disappear, as is also the case with greenstone and basalt, and the pillar now becomes a pile of two or more spheroidal rocks, resting one upon the other. Should a mass of rock be so situated as to preserve its equilibrium in spite of the gradual diminution of its base or point of support, a rocking-stone or loggan is the result. For an exposition of the principle regulating the stability of equilibrium of rocking-stones, see STABILITY. Various explanations have been given of the uses of these singular objects. They are supposed to have been used in very early times for purposes of divination, the number of vibrations determining the oracle; hence it came to be believed that sanctity was acquired by walking round them.

Some rocking-stones occur near to remains of ancient fortifications, which seems to bear out a statement in one of the poems of Ossian, that the bards walked round the stone singing, and made it move as an oracle of the fate of battle. In Greece, rocking-stones occur as funeral monuments, and are generally found on conspicuous places near the sea. Rocking-stones are numerous in Yorkshire, Derbyshire, Cornwall, and Wales. One near Land's End, in Cornwall, has been computed to weigh no less than 90 tons. Near Warton Crag, Lancashire, are no less than seven of these stones. In Scotland, they occur in the parishes of Kirkmichael, Dron, and Abernethy, Perthshire, and in the parish of Kells, Kirkcudbrightshire. In Ireland they are found in many places; one situated at a place called Islandmagee, on Brown's bay, is popularly believed to acquire a rocking tremulous motion at the approach of sinners and malefactors.

ROCK ISLAND, a co. in n.w. Illinois, bounded on the n.w. by the Mississippi river, drained by Rock river, crossed by the railroads centering at Rock island (q.v.); about 375 sq.m.; pop. '80, 38,315—27,914 of American birth. The surface is somewhat uneven. The soil is fertile. The principal productions are corn, wheat, and live stock. Co. seat, Rock Island.

ROCK ISLAND, a city of Illinois, at the foot of the upper rapids on the Mississippi, opposite Davenport, Iowa, 3 m. above the mouth of Rock river, 181 m. w. by s. of Chicago. The Mississippi is here crossed by a railway bridge, and the island from which the town is named has been selected as the site of a national armory. A dam across a portion of the river gives water-power for many manufactories. Pop. '60, 5,130; '70, 7,890.

ROCK ISLAND (*ante*), the co. seat of Rock Island co., on the Chicago, Rock Island and Pacific, the Chicago and Southwestern, the Peoria and Rock Island, and the Western Union railroads; pop. '80, 11,660. It is opposite the w. end of Rock island, which is a heavily timbered island of about 1000 acres, belonging to the United States, and having an armory and arsenal. The armory is meant to be the central armory of the United States, and will include, when completed, ten immense stone workshops run by the Moline water-power. Some of the workshops are already finished. Rock Island is a railroad center, which, with its situation on the river, makes it the shipping point for the region near. A bridge across the Mississippi here was erected at a cost of about $1,300,000. The upper rapids run from 3 m. below to 16 m. above Moline. The great dam at that point furnishes a water-power said to be equal to the combined water-power of New England. The manufacturing interests are important and rapidly growing. Among them are lumber-mills, cotton-mills, breweries, machine-shops, foundries, manufactories of glass, tools, etc. Rock Island has schools, churches, banks, 5 newspapers, a Swedish Lutheran college, etc.

ROCKLAND, a co. in s.e. New York, bordered on the e. by Tappan bay, a part of the Hudson river, on the s.w. by New Jersey; crossed by the New York, Lake Erie and Western, and the Northern New Jersey railroads; intersected by the Ramapo and Hackensack rivers, which rise here; 208 sq.m.; pop. '80, 27,690. The surface is mountainous, and the soil fertile. The Ramapo mountains in the w. part are bleak and barren, with some elevations of 1000 ft.; in the e. the Highlands extend along the Hudson. Granite, gneiss, limestone, and red sandstone are found here, the latter being extensively quarried for building purposes. Brick and lime are manufactured, and the agricultural interests are small; hay, butter, and corn are the main productions. Co. seat, Clarkstown.

ROCKLAND, a t. in Maine, on the w. side of Penobscot bay, 40 m. s.e. of Augusta. It has a broad and deep harbor, and 80 lime-kilns, making 1,200,000 casks of lime yearly, chiefly shipped to Boston and New York. Its commerce employs 18 ships, 40 barks and brigs, and 150 schooners. It has 3 banks, 2 newspapers, 8 churches, etc. Pop. '60, 7,316; in '70, 7,074.

ROCKLAND (*ante*), co. seat of Knox co., Me., on the Knox and Lincoln railroad, 40 m. s.e. of Augusta. Shipbuilding is extensively carried on. Among the manufactures are boots and shoes, carriages, harnesses, machinery, and tools. A government building for a custom-house and post-office was erected in 1874–75. Water is brought 2¼ m. by a costly system of water-works. There is a court-house and a public library. The city was set off from Thomaston in 1848 as East Thomaston, took its present name in 1850, and became a city in 1854.

ROCKLAND LAKE, a beautiful sheet of water in Rockland co., N. Y., 30 m. n. of New York city, 1 m. from the Hudson, and 160 ft. above its surface. It is celebrated for furnishing 200,000 tons of pure ice, annually harvested by about 1000 men, for the supply of New York, and for export.

ROCKLING, *Motella*, a genus of fishes of the cod and haddock family (*gadidæ*), having an elongated body, compressed toward the tail; the first dorsal fin very slightly elevated, and very delicate; the second dorsal and the anal fins long, continued almost to the tail fin. Several species are found on the British coasts, and are distinguished among other things by the number of their barbules, three, four, or five. The largest of them is never more than 19 or 20 in. long; the smallest, the MACKEREL MIDGE (*M. glauca*), only about an inch and a quarter. None of the species is much regarded by fishermen, one reason being that decomposition takes place very rapidly after they are taken out of the water, although, when quite fresh, they are not bad for the table.

ROCK-OIL. See NAPHTHA.

ROCKPORT, a t. in Essex co., Mass., on the Gloucester branch of the Eastern railroad; pop. '70, 4,480. It has churches, schools, a newspaper, banks, hotels, and a public library. There are granite quarries. The chief occupations are fishing and farming. Pigeon Cove, a summer resort, is in Rockport.

ROCK RIVER rises in the south-eastern portion of Wisconsin, and runs s.w. into Illinois, thence s.w., and empties itself into the Mississippi 3 m. below Rock island. Its course of 200 m. is through one of the most beautiful and fertile regions in the world, known as the "Rock River Country." Its frequent falls give abundant water-power, and it is crossed by 12 lines of railway.

ROCK-ROSE. See CISTUS.

ROCK-SALT is common salt (chloride of sodium) occurring as a mineral and in a solid form. It is always mixed with various impurities. It is found massive or crystallized, its crystals generally cubes, its masses very often either granular or fibrous. It is white, gray, or, owing to the presence of impurities, more rarely red, violet, blue, or striped. For its chemical and other qualities, see SALT. It is a very extensively-diffused mineral, and in some places forms great rock and even mountain masses. A hill of rock-salt near Montserrat, in Spain, is 500 ft. high. The island of Ormuz, in the Persian gulf, is formed of rock-salt. The Indus, in the upper part of its course, forces its way through hills of rock-salt, rising in cliffs 100 ft. above the river. In many parts of the world rock-salt is found in beds under the soil or other rocks. Those of Cheshire in England are particularly celebrated, as at present yielding almost all the salt used in Britain, great part of which is pumped from them in the form of brine. Part is also obtained by mining, as at Northwich. The mines of Wieliczka in Poland are of great extent. The workings are at depths varying from 200 to 740 ft., and the salt at the deepest working is the purest. Some of the chambers in the mines are said to be 800 ft. high. Blasting by gunpowder is often necessary in the mining operations. The mines give employment to 1200 or 1400 workmen; and they have been wrought for centuries. Vast quantities of rock-salt occur in many parts of Asia, Africa, and America. In Caramania and Arabia, rock-salt is sometimes used for building houses, the dryness of the climate rendering its solubility unimportant.—The salt which crystallizes on the margins and bottoms of salt lakes may be regarded as a variety of rock-salt. Concerning the salt of the ocean, the salt found in many desert regions as an effervescence on the ground or on rocks, the salt with which sandstone and other rocks are impregnated, etc., see SALT.

ROCK-SOAP, a mineral consisting of silica, alumina, peroxide of iron, and water, the silica nearly one-half, the alumina and the water sometimes nearly each one-fourth of the whole. It is earthy, easily broken, black or nearly so, very soft, and easily cut with a knife, is greasy to the touch, and adheres strongly to the tongue. It is valued by painters for crayons. It is found in a number of places on the continent of Europe, and occurs in trap rocks in the isle of Skye. It is only found massive.

ROCKVILLE, a village in Vernon, Tolland co., Conn., on a branch of the New York and New England, and a branch of the Connecticut Central railroads; pop. '70, about 5,000. It has churches, schools, hotels, a newspaper, gas and water works. There are several woolen-mills and other factories, for which, the water power is furnished by Hockanum river.

ROCKWALL, a co. in n.e. Texas, drained by branches of the Sabine and Trinity rivers; about 200 sq.m.; pop. '80, 2,984—2,952 of American birth. The surface is mostly rolling prairie. The soil is fertile. The principal productions are wheat and corn. Co. seat, Rockwall.

ROCK-WORK, an ornamental structure often introduced into gardens, for the cultivation of plants such as grow on or amongst rocks. It is made of rough blocks of stone rudely piled together, with earth, etc. Simple as it seems, it is very difficult of construction: and too often, after much expense, it has a paltry and ridiculous appearance.

ROCKY MOUNTAINS, that portion of the great ranges of mountains in the central and western portions of North America which lies in the United States and British possessions, a continuation of the Cordilleras of Mexico, between the Pacific ocean and 105° w. long., and reaching from Mexico to the Arctic ocean. In the United States the Rocky mountains extend over a breadth of 1000 m., and cover an area of 980,000 sq. miles. From lat. 32° to 40° n., the ranges bear nearly n. and s.; between lat. 40° and 45° n., their course is n.w.; then, after a more northerly bend, they keep a course nearly parallel to that of the Pacific, with many detached ranges and peaks, one of which, mount Elias, lat. 61° n., long. 141° w., is 17,800 ft. high, and marks the boundary-line of longitude between Alaska and the British possessions. Mount Shasta, in the coast-range in North California, is 14,000 ft. high; Fremont's peak, near the western boundary of Wyoming, and the sources of the Yellowstone and Colorado rivers, is 13,570 feet. In British Columbia, mount Brown, lat. 53°, is 16,000 ft.; and mount Hooker, 15,700 feet. The passes have elevations of 6,000 to 7,000 ft., and a vast territory is from 4,000 to 5,000 ft. above the level of the sea. The central range of the Rocky mountains forms the ridge which divides the rivers that fall into the Pacific from those that fall into the Arctic ocean, Hudson's bay, and the gulf of Mexico, and whose head-waters are often interlocked; but between the eastern and western ranges lie the territory of Utah and the state of Nevada, in which are large rivers having no other outlets than lakes, generally salt, as Great Salt lake in Utah, and Humboldt's lake, the outlet of Humboldt's river, in Nevada. The tops of the higher ranges are covered with perpetual snow, and their lower regions abount with artemesias, odoriferous plants, and sunflowers. The rocks are metamorphic gneiss, granites, porphyries, mica and talcose slates, and gold-bearing quartz, with deposits of mercury, silver, carboniferous limestone, coal, and petroleum. Anthracite has been found near the gold-mines of Santa Fé, and copper in New Mexico.

ROCKY MOUNTAINS (*ante*). Explorations and surveys of the vast extent of elevated plateaus, and the many separate ranges of this mountain system, have been made by the U. S. government with exceeding thoroughness. Colorado, Wyoming, New Mexico, and Utah, with the portion of the range which traverses them, have nearly complete scientific surveys, including their topographical and geologic features. The parts of the range in Idaho, Montana, Wyoming, Oregon, and Washington territories are less advanced in their surveys, which are still in progress. The first comprehensive exploration of this central part of the continent was made by capts. Lewis and Clarke in 1803–6 under the direction of president Jefferson, in connection with their exploration of the upper Missouri and the Columbia rivers. Maj. Z. M. Pike in 1805–7 traversed the plains to Pike's peak (named after him), discovered the head-waters of the Arkansas in the heart of the range in Colorado, and crossed into the great basin on the w. side of the range. In 1819–23 col. S. H. Long was sent with a party to make a scientific survey of the same region; the peak n.w. of Denver was named in his honor. The real first explorers of all the great interior parts of the continent were the hunters and trappers employed by the British and American fur companies, the latter operating from St. Louis. The most extensive explorations by any one scientific party, however, were made in the three expeditions led by col. John C. Fremont under government authority. The first in the winter of 1842–43 made a survey of the South pass and discovered the Wind River mountains, the highest peak of which Fremont ascended and measured, and it received his name. The second expedition started in May, 1843, and explored the route by Bridger's pass over the mountains, located the Great Basin of Salt lake, and crossed to the Columbia river, returning by the way of the Great Basin. In 1846 gen. P. Kearney traversed the Rocky mountains with a military party to California, and returned overland in 1847. Fremont's last explorations were in 1848 up the Rio Grande from Santa Fé and thence across the great chain w. to the Great Basin. In 1853 the government ordered extensive surveys in the Rocky mountain country, the results of which are contained in 18 vols. of maps and reports. These were the bases of the support given by the government to the construction of the Union Pacific railway 1866–70. The U. S. scientific surveys completed and in progress, under the direction of prof. Hayden, I. W. Powell, Clarence King, and other able scientists, will be almost unequaled in their completeness. The search for the precious metals also fills the region with an advance corps of unscientific explorers.

The vastness of area of the Rocky mountains, their erratic and widely separated ranges, spurs, and groups of mountains, and the extent of the great plateaus at high elevations, impress the mind far more than their picturesquenees or scenic character. The Andes in South America form a much loftier and narrower chain. Persons familiar with them, or with the Alps, find the scenery of the Rocky mountains relatively tame. Travelers by the Union Pacific railway which gains the first continental divide at Bridger's "pass," at an altitude of 7,000 ft., are astonished to see a broad rolling gravelly plain stretching away on all sides, and the mountains forming the horizon apparently of no great height. Rising from a base of plains 4,000 to 6,000 ft. above the sea, the mountains only begin at those levels.

The Rocky mountains are the summit divide of North America, and a continuation of the chain of the Andes of South America. At the isthmus of Darien, sinking to a minimum elevation of 100 ft. above the sea, they increase in height northward through Central America, where their well-watered summits, on the Pacific side in Costa Rica, have the most delightful of climates. In Guatemala they rise into the volcanic elevations of Fuego and Agua, 13,000 and 14,000 ft. high respectively; and thence into Mexico, where, in lat. 19°, the chain is 300 m. wide and rises into the loftiest elevations of the continent, in a chain of mountains running e. and w., forming the volcanoes of Popocatepetl, 17,540 ft.; Orizaba, 17,176 ft.; Toluca, 16,610 ft.; and Iztaccihuatl, 15,705 feet. North of this loftiest part, between the eastern and the western declivities of the great mountain mass, is the plateau of Mexico, a comparatively level plain from 3,000 to 6,000 ft. above the sea (averaging 5,000 ft.) extending from the city of Mexico 1200 m. northerly to the United States line, of a width varying from 200 to 500 miles. See MEXICO. The highest part, or main chain, where it enters the United States from western Chihuahua, is known as the Sierra Madre, and is there 180 m. in breadth, of purely mountain country, the highest parts of which are about 8,000 ft. above the sea. The eastern slopes are well-watered and fertile. Cotton and the grape are grown on the lower parts. The Sierra Madre mountains spread into a number of branching ranges in Arizona, difficult to classify; nowhere rising into mountains of so great height as in southern Mexico or Colorado, and forming elevated plateaus of a more irregular character than those of Mexico. The easterly side of the chain where it enters New Mexico has an altitude of from 6,000 to 8,000 ft., increasing northwardly to the Colorado line, near the source of the Rio Grande, where many peaks rise to 14,000 feet. Through Colorado the range maintains a grand elevation. Here the U. S. surveys have been most elaborate, and the attention given to the country by the discoveries of great numbers of mines, and ready access afforded by railways, have made this state the most noted for the study of the mountains. See COLORADO. The streams which flow e. to the Mississippi and s.w. to the gulf of California rise in snow-covered ranges inclosing a system of "parks" which have given the name of "the park system" to this part of the Rocky mountains. It is bounded n. by the Laramie plain, e. by the great plains, w. by the cañon-rifted plateaus of the Colorado, and on the s. merges into the valley of the upper Rio Grande. North park is the basin of the head streams of the North fork of the Platte; Middle park is the basin of the sources of Blue river (the North fork of Grand river) flowing to the Colorado; South park is the basin of the springs of the South Platte, and one of the head streams of the Arkansas; and San Luis park the basin at the source of the Rio Grande. All these parks lie at elevations from 5,000 to 7,000 ft. above the sea, and gather the drainage of the snowy ranges to carry them to the gulf of Mexico on the e. and the gulf of California on the west. For geologic and topographical surveys of this region see COLORADO and NEW MEXICO. The easterly range in view from Denver is called the Colorado range; its continuation n. forms the Medicine Bow range; w. of the Middle and North parks is the Park range. The Colorado range by a westward trend connects at mount Lincoln with the Park range, and divides North park from Middle park. The Park range, which lies nearest to the great plateaus of the head-waters of the Colorado w. of Middle park, becomes a middle range further s., and lies e. of the upper valley of the Arkansas. A third range, having its n. head in the mountain of the Holy Cross, becomes the westerly range. Its n. parts take the name Sawatch range, and the southern the San Juan range. It has more elevations reaching to 14,000 ft. than any other part of the Rocky mountains in the United States. South of the Sawatch range the country is broken into great mountain masses too isolated to suggest a range. The Pike's peak group is the most north-easterly group of this character. The following table gives the altitudes of the main elevations of these ranges:

	Feet.		Feet.
Gray's peak, Colorado range	14,341	Mount Chavano, Sawatch range	14.093
Torrey's peak, " "	14,336	Castle peak, Elk mountain range	14,115
Mount Evans, " "	14,330	Capital mountain, " "	13,977
Long's peak, " "	14,271	Snowmass " " "	13,970
Mount Guyot, " "	13,565	Pyramid peak, " "	13,885
Mount Lincoln, Park, "	14,297	Greenhorn Mt., Wet Mt. "	12,230
Buffalo peak, " "	13.541	Garland peak, Sangre de Christo range	14,300
Mount Powell, " "	13,398	Crestone, Sangre de Christo range	14,233
Pike's peak	14,147	Mount Thomas, Sierra Blanca range	11,496
Mount Harvard, Sawatch range	14,375	Mount Wilson, San Juan mountains	14,280
Mount Elbert, " "	14,351	Unkarpagri, " " "	14,235
La Plata, " "	14,311	Mount Sniffles, " " "	14,158
Massim mountain, " "	14,298	Mount Eolus, " " "	14,054
Mount Autoro, " "	14,245	Handie's peak, " " "	18,997
Mount Princeton, " "	14,196	Rio Grande pyramid, " "	13,773
Mount Yale, " "	14,187	Mount Osa, " " "	13,640
Holy Cross mountain, "	14,176		

North of Colorado and on the line of the Union Pacific railway, there is a relatively low part of the great chain, which was formerly known by the names of its lowest points, as South pass, Bridger's pass, etc. The Union Pacific railway took the latter. The Black hills are the most easterly outlying spur of the range n. of these passes. The main chain trends n.w., and spreads over an area 300 m. wide in Wyoming; its easterly ranges in the w. part of that territory taking the names Big Horn mountains and Wind River mountains. The greatest elevation and some of the most picturesque parts of the range are at the Three Tetons, near the w. line of Wyoming, s. of the National park at the head of the Yellowstone. See NATIONAL PARK OF THE YELLOWSTONE. On the n. side of the Snake river, in Idaho, the range develops a volcanic character up to recent times. Isolated and exceedingly irregular and lofty uplifts fill the whole of central Idaho, and nearly all of Montana. (See those territories.) South of the great valley through which the Union Pacific railway is laid there are the lofty and isolated ranges named Wahsatch and Uinta. The former is the most abrupt elevation on the eastern border of the great basin. Its western slopes drain into the Jordan river and Great Salt lake, and its eastern slopes into the Colorado. Its greatest elevations, Twin peaks, Lone peak, and mount Nebo, are about 12,000 ft. above the sea, and as their summits are not more than 20 m. from the valley of the Jordan, 4,500 ft. above the sea, they form a peculiar group which arrests and attracts the moisture from the air currents of those regions and concentrates upon their heads an amount of snow-fall in the winter greater than upon any other part of the Rocky mountain in the United States. Near the sources of the streams that empty into the Jordan the avalanches and snow-slides are more frequent and dangerous than elsewhere. The Uinta mountains is a range or mountain mass connecting the Wahsatch with the main ranges east.

North of the United States the range is supposed to have an equal breadth of ramification, and its elevations are greater. Mounts Hooker and Brown, 300 m. n.w. of Idaho, have an altitude of 15,700 and 16,000 ft. respectively. The range is thence northward continuously lofty, and forms the westerly wall of Mackenzie's river, flowing into the Arctic sea, but is pierced in several places by streams rising w. of the range, and emptying either into that river or into streams that flow into Hudson's bay.

Some authors name all the mountains between the basin of the Mississippi and the Pacific as portions of the Rocky mountains, and classify them into park ranges, basin ranges, plateaus, Sierras of Nevada, Coast range, and Cascade mountains. The three latter ranges have no more reason to be included with the Rocky mountains than the Alleghanies. The uplift beginning in the Pacific ocean, and forming the peninsula of Lower California, continues northward into the lofty Sierras of Nevada, the Cascade mountains in Oregon and Washington, and through Alaska to mount St. Elias, 16,758 ft. high, near the shore of the n. Pacific. In the Sierras of California, mounts Shasta, Tyndall, and many others are upward of 14,000 ft. high; and mounts Jefferson and Hood in Oregon territory, mounts Rainier and Baker in Washington territory, are still higher. This great range is distinctly separated from the Rocky mountain system by the valley of the Colorado river, the great interior basins, and the valleys of the upper Columbia, Fraser, and Yukon rivers. For the geology, natural history, topographical, and climatic details of the Rocky mountain system, see the states and territories traversed by them. For Pacific coast ranges see CALIFORNIA, OREGON, WASHINGTON, and ALASKA.

ROCO'CO, a name given to the very debased style of architecture and decoration which succeeded the first revival of Italian architecture. It is ornamental design run mad, without principle or taste. This style prevailed in Germany and Belgium during last century, and in France during the time of Henry IV.

ROCROI, a small t. of France, in the dep. of Ardennes, 15 m. n.w. of Mézières, is a fortress of the fourth class, and is situated in a fine, extensive plain, bounded on all sides by the forest of Ardennes. Pop. '76, 1052. It is memorable for the victory gained by the great Condé (then duke of Enghien) over the Spaniards, May 19, 1643. The Spanish army was composed of veteran bands of Walloons, Spaniards, and Italians; and their general, Don Francisco de Mellos, the governor of the Low Countries, was a commander worthy of his army. The French (22,000) were also good troops; but their general, Condé, was a young and inexperienced officer. At first the battle was unfavorable to the French, but at last the Spaniards were thrown into irretrievable rout. The count of Fuentes, the commander of the redoubtable infantry, and 10,000 of his men, were among the slain; and 5,000 men, with all the cannon, many standards, and the baton of the count de Mellos, were captured. But, far beyond all material losses, the renown of invincibility, first acquired by the Spanish infantry on the field of Pavia (1525), and confirmed at St. Quentin, Gravelines, and Prague, was destroyed.

ROD, called also a *pole*, or *linear perch*, a measure of length of 5½ yards, or 16½ feet. The square rod, called generally a *rood*, is employed in estimating masonry, and contains 16½ × 16½, or 272¼ square feet.

RODEN'TIA (Lat. gnawers), or RODENTS, in the system of Cuvier, an order of mammalia, almost exactly corresponding with the *glires* of Linnæus. The order is a truly natural one, and is therefore universally recognized by naturalists. The rodentia are small quadrupeds; the largest of them—the capybara—not being equal in size to a hog, while to this order belong the smallest of mammalia. They are very numerous, and widely distributed over the globe, particularly abundant in South America, and rarest in Australia. They are all remarkably characterized by their front teeth, variously regarded as incisors and canines—the true incisors or canines being absent—which are large and of peculiar structure, two in each jaw, and separated by a considerable vacant interval from the molars. The front teeth have a plate of hard enamel in front, which wears more slowly than the substance of the rest of the tooth, so that being employed on hard substances, they acquire a chisel-like form, and unlike the teeth of mammals in general, they are always growing from a fresh pulp at the base, so that compensation is made for the wearing away at the tips; but when a tooth is accidentally destroyed, the opposite tooth continuing to grow, sometimes acquires a monstrous shape and size, from which cause rats and other rodents have been known to die, the enormous tooth preventing the eating of food, or even recurving and piercing the skull. The ordinary food of most rodents consists of vegetable substances, and generally of a pretty hard kind, and their front teeth are adapted for comminuting it by gnawing, and are also used for gnawing wood, the shells of nuts, etc., in order to obtain access to food. The molar teeth have flat crowns, having ridges of enamel, which make them more or less tuberculous; and these are in the line of the jaw, while the only horizontal motion of which the lower jaw is capable is forward and backward, thus making the ridges of the molar teeth powerful instruments for the reduction of hard substances; the jaws also being in general very strong. In the rodents which eat only vegetable food, the molar teeth have rounded tubercles; while in the omnivorous kind—as rats—the tubercules become sharp points. The stomach is simple; the intestines are very long; the cæcum is often large, sometimes larger than the stomach itself. The brain is not large, and is nearly smooth, and without convolutions; the rodents are not generally distinguished for sagacity, although some of them—as the beaver—exhibit remarkable instincts. Most of them may be easily tamed, but few of them seem capable of learning anything, and in general they merely acquire a familiarity with man. Of this the rabbit exhibits a very perfect example, although the rat seems to display a far higher intelligence. The eyes are directed laterally. The rodents very generally have the hinder limbs larger than the fore, and their motion is partly a kind of leaping. In some, this is as completely the case as in kangaroos. Some, as squirrels, have an admirable power of climbing trees; and a few, as beavers and water-voles, are aquatic. Most, if not all, have the habit of sitting on their haunches, and holding their food to their mouth by their fore-paws; using both paws together, however, as the fore-feet have not at all the character of a hand. The thumb is never opposable to the other toes; sometimes it is rudimentary or wanting. The bones of the fore-leg are generally separate, but have not so much freedom of motion as in the *carnivora*. The toes are terminated by claws. The presence or absence of clavicles (collar-bones) divides the order into two sections, to the first of which, having clavicles, belong squirrels, mice, rats, voles, the beaver, etc.; and to the second, without clavicles, belong porcupines, cavies, chinchillas, hares, rabbits, etc. The rodents are very numerous, about 400 species being known.

RODERIC, the last king of the Visigoths in Spain, whose tragic downfall, coincident with that of the Visigothic monarchy, has inspired poets and romancers (including historians) to throw round him a halo of glory. The Spanish and Arab historians contradict each other in almost every particular of Roderic's life—the latter, on the whole, being apparently the more trustworthy. According to them, Roderic was of humble birth, but rose, through his talent and bravery, to the command of the cavalry. A conspiracy having been formed against Witiza, the reigning monarch, by the clergy and the nobles of Roman blood, Roderic was elevated to the throne in 709, and by his energy and talent soon quelled all opposition. The sons of Witiza, however, joined with some malcontent Visigothic nobles—among whom was count Julian—and agreed to summon to their assistance the Arab chief, Muza ibn Nozeir, who had just finished the conquest of Mauritania. The Spanish writers, on the other hand, assert that the country groaned under the tyrannical government of Roderic, that his licentious behavior had disgusted many of his nobles, and that the people were ripe for a revolution when the Moslem invasion took place. Both are agreed as to the time and mode of the invasion; but the Arab historians brand count Julian with the most atrocious treachery, as not only voluntarily surrendering Ceuta, the key of the country, but actually guiding the 13,000 Berbers and Arabs under Tarik into Spain. A landing was effected at Algesiras, April 28, 711; and in spite of vigorous opposition from the governor of Andalusia, Tarik marched on, routing Roderic's chosen cavalry, which had been sent to oppose him. Roderic, who had been employed in another quarter, now hastened at the head of an army, which is variously estimated at from 50,000 to 100,000 men, to oppose the daring invaders, who by this time had been so re-enforced from Africa and by rebels that their numbers amounted to 25,000. The two armies met on the banks of the Gaudalete, near Xeres de la Frontera, and on July 17, the battle commenced. Roderic directed the center of his army in person, appointing the sons of Witiza to command the wings, and the battle raged furiously for three days; a single combat then took place between Roderic and Tarik—a kind of statement extremely frequent in eastern histories—in which the former was slain, and his head cut off, to be embalmed and sent to Muza. The Christians, enraged at the loss of their chief, fought furiously during six days longer, but all in vain, for victory now declared itself decisively in favor of the Moslems, to whom the sons of Witiza had deserted soon after the commencement of the contest, and the rout of Roderic's army was complete. The most ancient Spanish chroniclers agree in asserting that Roderic either died on the field or sunk in the Guadalete, whilst attempting to save himself by swimming his horse across; and the various stories of his escape and subsequent adventures are of much later date. This decisive victory laid all central and southern Spain at the feet of the Arabs. Roderic has been made the hero of an epic poem by Southey.

RODEZ, a small t. of France, capital of the department of Aveyron, stands on the crest and slope of a hill, on the n. bank of the Aveyron. Its streets are steep, narrow, winding, and dirty; but the promenades around the town are pleasant. The cathedral, with a clock-tower of great height, is a Gothic structure of the 15th century. A variety of woolen cloths are manufactured, and cheese of a highly esteemed quality is made. Pop. '76, 12,881.

RODGERS, C. RAYMOND P., b. N. Y. 1818; entered the navy as midshipman 1833; rose through successive grades to commodore, 1870. He was in the Mexican war; on the coast survey in 1850, and 1856–58; commandant in the naval academy 1859–61. In 1861–62 he commanded the flagship *Wabash*, s. Atlantic squadron. He was on active duty at the battle of Port Royal and fort Pulaski, in the expedition to St. Augustine and St. Mary's river. He was fleet capt. of the s. Atlantic blockade squadron 1863, commanded the steamer *Iroquois* 1864–65, the frigate *Franklin* in the European squadron 1869; and in 1871 was appointed chief of the bureau of docks and yards.

RODGERS, JOHN, 1771–1838; b. Md.; entered the naval service in 1798 as a lieutenant, and was executive officer of the frigate *Constellation* under com. Truxton at the time the French frigate *L'Insurgente* was seized off Nevis, Feb., 1799. For his brave conduct in this action, he was promoted to a captaincy, took command of the *Maryland* and cruised near the West India station. In June, 1803, he commanded the *John Adams*, and with the assistance rendered by the *Enterprise*, made a successful attack on a cruiser with 22 guns, and also on other vessels at anchor near Tripoli. In 1804 he commanded the *Congress* at Tripoli in the squadron fighting under com. Barron, whom he succeeded in 1805. After peace was declared he sailed to Tunis accompanied by his squadron, and was successful in establishing friendly relations with its authorities. In 1811, while on the *President*, off Annapolis, hearing that a man had been forced into service on a British frigate then at Sandy Hook, he sailed at once for that point, and finding a man-of-war there hailed her; after some time an answer was given followed by a shot, and a short engagement ensued in which the British vessel, *Little Belt*, was much injured. Com. Rodgers discovering the crippled condition of his opponent, ceased firing and boarded the vessel, offering assistance, which was declined. The account given of this action by the commanders differed widely, and added to the breach then existing between the British and the Americans. In 1812, war being declared against Great Britain by the United States, com. Rodgers was placed in command of a squadron stationed near New York, and discovering the British ship *Belvidere*, chased her, and a running fight followed, in which capt. Byron (British) was wounded, and com. Rodgers also, the latter by the bursting of a gun on his own vessel, the *President*. On a cruise soon after he captured a number of British merchantmen, and also the packet *Swallow*, which carried a large amount of specie. In 1814 he was ordered to the command of the new frigate *Guerriere*, and rendered valuable aid in the defense of Baltimore. From 1815 to 1824 he was president of the board of naval commissioners, and in 1823 acting secretary of the navy; from 1824 to 1827 he had command of the squadron in the Mediterranean. After his return he again served as navy commissioner till 1837. At his death, which occurred at Philadelphia, he was senior officer of the navy.

RODGERS, JOHN, b. Md. 1812; entered the navy in 1828, and was made lieutenant in 1840. He served through the Seminole and Mexican wars, and was promoted commander in 1855. He went on an exploring expedition to the n. Pacific 1853–56, and was made capt. in 1862. In the latter year he supervised the construction of some gunboats in the west, led a gunboat expedition up the James river, and in command of the *Galena* attacked fort Darling. In 1863 he commanded the monitor *Weehawken*, and in Warsaw sound fought and captured the strong confederate iron-clad *Atlanta*. He was afterward in command of the Asiatic squadron, and in 1871 bombarded and captured the Corean forts.

RÖ'DIGER, EMIL, 1801–74; b. Germany. After studying theology at Halle, appointed professor of oriental languages at that university; removed to Berlin in 1860, and resided there for the rest of his life. He published a new edition of Lockman's *Fables* (1830); *Syrische Chrestomathie* (1838); *Himjaritische Schriftmonumente* (1841). After the death of Gesenius he finished his *Thesaurus Linguæ Hebraicæ*, and edited his Hebrew grammar from the 13th to the 21st edition (1874).

RODIYAS, a degraded race in Ceylon, who are expelled from society, and live in a condition more abject than that of the Pariahs of India. By some they are thought to be a branch of the Veddahs (q.v.). Under British rule, which does not recognize caste the Rodiyas have improved socially, and are no longer disqualified for labor. For many interesting particulars respecting this unfortunate race, see *Ceylon*, by sir J. E. Tennent, vol. ii. p. 191.

RODMAN, THOMAS J., 1818–71; b. Ind.; graduate of West Point, commissioned brev. 2d lieut. of ordnance 1841. He was the inventor of the 15 in. and 20 in. smooth-bore guns made by hollow casting. He was the author of improvements in the manufacture of gunpowder for large pieces, and invented the *mammoth powder* and *perforated cake*. He published (1861) *Reports of Experiments on the Properties of Metal for Cannon*.

RODNEY, CÆSAR, about 1730–83; b. Dover, Del.; son of William, who came over with Penn. He was a signer of the declaration of independence; appointed high sheriff at 28; became a justice of the peace, and judge of the lower courts. In 1765 he was sent to the "stamp act" congress at New York. He was speaker of the house in 1768, and for some years afterward delegate to the general congress, and brig.gen. in 1774. He was active in providing supplies for the state troops in the commencement of the revolutionary war, and was in active service in 1777, commanding a brigade of the Delaware line, near Princeton. Elected to congress in the same year, he was also elected president of the state of Delaware, and chose to accept the latter honor, holding the position four years.

RODNEY, GEORGE BRYDGES RODNEY, Lord, English admiral, b. Feb. 13, 1718, was second son of capt. Rodney of the royal marines. He was taken from Harrow school at the early age of 12, and sent to sea. He became lieut. in 1739; post-capt., 1742; and commander of the Newfoundland station in 1748, with the rank of commodore. In 1752, he returned home, and was elected M.P. for Saltash. He afterward commanded the *Fougueux*, the *Prince George*, and the *Dublin* men-of-war. In 1759, after 28 years' active service, he was made rear-admiral; and in July he bombarded Havre for two or three days, destroying the town and fortifications so effectually, that it has never recovered its former importance as an arsenal for ships-of-war. In 1761 he took Martinique, Grenada, and Santa Lucia. In 1762 he became vice-admiral, and in 1764 was made a baronet. In 1779 Spain joined France in the war against England, and their united fleets appeared in the channel in overwhelming force. The siege of Gibraltar was undertaken by the Spaniards; and Rodney, who was sent out with 22 sail of the line and 8 frigates to the West Indian station, was ordered to relieve Gibraltar *en route*. After capturing seven Spanish ships-of-war, he fell in, Jan. 16, 1780, with admiral Langara, off cape St. Vincent, "that promontory which has witnessed more of our battles and triumphs than any other headland in the world." Of the Spanish fleet, five were captured and two destroyed. Having accomplished the relief of Gibraltar and Minorca, he quitted the Mediterranean, and crossed the Atlantic to the station of his command. On April 17 he defeated, near Martinique, the French fleet, under the count de Guichen. Being ill-supported by his captains on this occasion, he complained to the admiralty. The naval administration of the day was, however, so corrupt and rotten, that the admiralty suppressed the criminatory passages of his dispatches, and only one of the accused was brought to trial, the others being allowed to escape from the difficulty of finding a sufficient number of non-delinquent officers to try them. Rodney took Eustatia from the Dutch, with 250 ships and other booty, estimated at three millions sterling. Demerara and Essequibo next surrendered. On April 12, 1782, Rodney, in conjunction with Hood and Drake, encountered the French fleet under De Grasse off Dominica, April 12, 1782. Each fleet consisted of upward of 30 ships of the line. The battle was more obstinately contested than any engagement that ever took place between the two nations, being kept up without intermission for nearly 12 hours. De Grasse was totally defeated, and Rodney lost seven ships of the line and two frigates. Owing to the French vessels being crowded with troops, they are said to have lost 3,000 killed and 6,000 wounded; while the English loss did not exceed 600. On board the *Ville de Paris* were 36 chests of money, to pay the soldiers; and the whole train of artillery was on board the other captured ships. Count de Grasse was himself taken prisoner. His flag-ship, the *Ville de Paris*, of 112 guns, was the only first-rate man-of-war that, up to that date, had ever been taken and carried into port; and De Grasse, when he landed at Portsmouth, was stated to be the first commander-in-chief of a French fleet or army who had been prisoner in England since the capture of marshal Tallard in queen Anne's wars. In this action, Rodney successfully executed the nautical maneuver of breaking the French line, and placing the enemy between two fires, which had fallen into disuse since the commonwealth. Rodney's victory saved Jamaica, ruined the naval power of France and Spain, and gave the finishing blow to the war. The news arrived in England just after an order had been dispatched for the recall of Rodney, whose politics differed from those of the new ministry He was now elevated to the peerage as baron Rodney, and received a pension of £2,000 per annum for himself and his successors. He lived in retirement for the rest of his life. He died May 21, 1792, leaving behind him the fame of one of the most distinguished commanders in the naval annals of Great Britain. A monument was erected to his memory in St. Paul's cathedral, and his portrait by sir Joshua Reynolds, is among the treasures of Greenwich hospital.

RODOSTO, a t. of European Turkey, in the vilayet of Adrianople, stands on the n. shore of the sea of Marmora, 77 m. w. of Constantinople. It is surrounded by beautiful gardens, contains many mosques, and sends large quantities of fruits and vegetables to the capital of the empire, Pop. 18,000.

RODRI'GUEZ, Alfonso, 1526–1616; b. Spain. After graduating in theology at the Salamanca college in 1545, he became a Jesuit. He was made instructor in theology at Salamanca, and later was rector of the Monterey college. He was celebrated as an abstruse theologian of the casuists' school. In the latter part of his life he lived at Valladolid, Montilla, and Seville. His works on the *Practice of Christian Perfection* was translated into many languages.

ROE, *Cervus capreolus*, or *Capreolus dorcas*, a species of deer (q.v.) inhabiting Europe and some parts of Asia, chiefly in hilly or mountainous regions either covered with forests or with scattered bushes and heath. It is seldom found in the higher and more naked mountain tracts, the haunt of the stag or red deer. It was once plentiful in Wales and in the hilly parts of England, as well as in the s. of Scotland, but is scarcely now to be seen in any part of Britain s. of Perthshire. It is not long since it was pretty common in some of the wilder parts of the n. of England. The roe is about 2 ft. 3 in. in height at the shoulder. Its weight is about 50 or 60 lbs. Its color is a shining tawny brown in summer, more dull and grizzled in winter, the lower parts and part around the tail white. There is considerable variety in the shade of color. The hair is longer than in many deer. The tail is very short, concealed among the hair. The horns, which are peculiar to the male (the *roebuck*), are 8 or 9 in. long, erect, round, very rough, longitudinally furrowed; having, in mature animals, two tines or branches, which, as well as the tip of the horn, are sharp-pointed, so that the horns of the roe become very dangerous weapons when used for offense. The ears are large. The habits of the roe somewhat approach to those of the goat, or even of the chamois. It keeps its footing on rocks with great security, bounds very actively, and takes great leaps. Its usual pace, when not very hard pressed, is, however, a kind of canter. It is not gregarious. not more than a buck and doe with one or two fawns being usually seen together. Contrary to what is usual among deer, the male and female roe remain attached during life. The voice of the roe, resembling that of a sheep, but shorter and more barking, is often heard through the night in regions where it is plentiful. The browsing of the roe is very injurious to young woods, a circumstance which has led to its extirpation in places where it would otherwise have been cherished. It feeds much on the tender shoots of trees and bushes as well as on herbage. The venison is superior to that of the stag, but not equal to that of the fallow-deer. The horns are used for handles of carving-knives, etc. The roe is never very thoroughly tamed, and when partially so, is apt to become mischievous and the male dangerous.—Another species of roe (*cervus* or *capreolus pygargus*), rather larger than the common roe, is found in Tartary.

ROE, Edward Payson, b. N. Y., 1838: studied at Williams college and at Auburn theological seminary. In 1862 he was appointed chaplain of the 2d N. Y. light cavalry, and was two years in the field, when president Lincoln appointed him chaplain of the fortress Monroe hospitals. At the close of the war he accepted a call from the Presbyterian church at Highland Falls, N. Y. In 1872 he published his first story, *Barriers Burnt Away*, which achieved an immediate popular success, which was followed by a like result on the publication of other works of fiction of a similar general character. In 1874 he removed to Cornwall-on-the-Hudson, and from that period has devoted himself to a literary life. He has written *What Can She do?; Opening a Chestnut Burr; From Jest to Earnest;* and other stories. In 1873 he published a horticultural work, entitled *Play and Profit in my Garden;* and in 1881, *Success with Small Fruits*, an illustrated volume which has been translated into the French and Japanese languages. More than 250,000 copies of his books have been sold in the United States; and they have been reprinted in England, and translated into German.

ROEBLING, John Augustus, 1806–69; b. Germany; studied civil engineering at the polytechnic school of Berlin, and at his graduation read a thesis on suspension bridges, a branch of his profession to which he devoted himself. In 1831 he came to America and settled near Pittsburg, Penn. He was made assistant engineer on the slack-water navigation of the Beaver. After receiving similar engagements in other places, he was appointed to survey the route across the Alleghanies adopted by the Pennsylvania Central railroad. He then commenced the manufacture of wire rope, and in 1844 replaced the wooden aqueduct of the Pennsylvania canal across Alleghany river by a suspension aqueduct, completed in May, 1845. Afterward he constructed the Monongahela suspension bridge at Pittsburg, and from 1848–50 four suspension aqueducts on the Delaware and Hudson canal. He established his works at Trenton, N. J., and in 1851 commenced the great suspension bridge at Niagara river. In 1867 he began the Cincinnati suspension bridge, which has a clear span of 1057 feet. His last enterprise was the bridge across the East river, connecting Brooklyn and New York. The designs were completed and work had begun on the bridge when Mr. Roebling died from the result of an injury he received in 1869 while directing the construction. He published *Long and Short Span Bridges* (1869). He has been succeeded by his son Washington A. Roebling, who has since devoted himself to the construction of the East river bridge.

ROEBUCK, John Arthur, English politician, was b. at Madras in 1801, but passed his youth in Canada. At the age of 23 he came to England, and was called to the bar at the Inner temple in 1831. He challenged the suffrages of the electors of Bath as a radical reformer in 1832, and represented that city until 1837. He was again elected in 1841, and held his seat until the general election (1847). In May, 1849, he was returned for Sheffield, which he represented till 1868; and for which he was again returned in 1874. In 1835, when the executive government of Canada and the house of assembly of lower Canada were at variance, the latter body appointed Roebuck their paid agent in England—a position which involved him in a serious quarrel with the press. He was next the central figure of a parliamentary "scene," on the occasion of a too plentiful crop of election petitions and election compromises subsequent upon a general election. He made out such a case that, in defiance alike of whigs and tories, he obtained a committee to inquire into election compromises. His next great appearance was at the meeting of parliament in Jan., 1855, when he gave notice of a motion for inquiring into the condition of the army before Sebastopol. To the undisguised joy of the nation, Roebuck carried his motion by an immense majority, and the administration of the earl of Aberdeen was shattered to pieces. The Sebastopol committee sat, and the inquiry exercised great influence in the subsequent reconstruction of the war department, and the reorganization of our military, commissariat, and medical systems. In 1855 he became a candidate for the chairmanship of the Metropolitan board of works, with a salary of £1500 per annum, but was only third on the poll. On the annexation of Savoy and Nice in 1860 Roebuck indulged in the sharpest invective against the emperor Napoleon. He became a director of the Galway steam-packet company, and offended his constituents by defending a contract which they regarded as savoring of a political job. He went to Vienna to obtain some commercial concessions for a company with which he was connected, and returned with strong pro-Austrian sympathies, volunteering a defense of Austrian rule in Venetia, which jarred upon public feeling. During the civil war in America he displayed a strong leaning toward the cause of the confederates. In the debate on the war between Germany and Denmark, Roebuck declared (1864) that the English fleet ought to have been sent to defend Denmark. He warmly supported the earl of Beaconsfield's policy during the Eastern crisis in 1877–78, and in 1878 was made a member of the privy council. Roebuck is fearless and unmeasured in attack, not too charitable in his judgments, fond of personalities, but is regarded as an honest and true-hearted Englishman. He is the author of a work on the *Colonies of England*, the *History of the Whig Ministry of* 1830, and in his earlier years contributed much to the *Westminster* and *Edinburgh Reviews*.

ROEMER, Olaus, or Ole, 1644–1710; b. Jutland, Denmark; educated at the Copenhagen university. He accompanied Picard to France and was appointed tutor to the dauphin by Louis XIV. He became eminent in astronomy and mathematics and was made a member of the academy of sciences in 1672. He was an associate of Picard and Cassini in many investigations and discoveries. Roemer was the first to measure the velocity of light by the eclipses of the satellites of Jupiter. In 1681 he returned to Denmark as professor of astronomy at Copenhagen, held several public positions, and finally became chancellor of the exchequer. The results of his scientific work were published by Horrebow in 1753 under the title of *Basis Astronomiæ*.

ROERMOND (Fr. Ruremonde, called also by old writers Godswaard [i.e., God's island] op de Maas), an old but lively t. in the Netherlands, province of Limburg, at the junction of the Roer and the Maas. A suburb called St. Jacob is connected with Roermonde by a beautiful stone bridge over the Roer. The cathedral is one of the handsomest churches in the Netherlands. Pop. '75, 9,609, about 350 being Protestants, 100 Jews, the remainder Roman Catholics. Principal industries are weaving woolen cloths, cottons, making paper, pipes, wax and tallow candles, cotton-spinning, calico-printing, refining salt, etc. Roermond is said by some authorities to have been the birth-place of the celebrated Mercator, others claiming the honor for Rupelmonde in East Flanders. It has often endured the horrors of being besieged and taken.

ROE-STONE, a name locally given to those limestones which are formed of small globules like the roe of fishes. It has been translated into the scientific term *oolite*, and this is applied to that period in the earth's geological history in which the limestones with this structure chiefly occur.

ROGATION-DAYS (Lat. *Feriæ Rogationum*), the Monday, Tuesday, and Wednesday before ascension-day, so called because on these days the litanies (q.v.) are appointed to be sung or recited by the clergy and people in public procession. The practice of public supplications on occasion of public danger or calamity is traceable very early in Christian use; but the fixing of the days before ascension for the purpose is ascribed to Mamercus, bishop of Vienne, in the middle of the 5th c., who, on occasion of a threatened earthquake or other public peril in his city, ordered a public procession and prayer, for the purpose of averting the divine anger. The usage being in harmony with the spirit of the times, became general and permanent, and the form of prayer employed is that known as the *Litany of the Saints*. In England, after the reformation, the recitation of the litanies upon these days was discontinued; but a memorial of the old practice long survived in the so-called perambulation of parishes (q.v.).

ROGER I., Count of Sicily and Calabria, and the founder of the Norman dynasty in these countries, was the youngest of the twelve valiant sons of Tancred de Hauteville, and was born in Normandy about 1031. Hearing of the wondrous success of his brothers (see GUISCARD), who had some time before departed to follow their fortunes, and had by this time gained possession of the greater part of southern Italy, Roger set out in 1058 to join them. On his arrival, he was deputed by his brother Robert to conquer Calabria, an achievement which was speedily executed. In 1060 he set out on an expedition against Sicily, then ruled by a number of Saracen chiefs; but he confined himself in this and the following expedition to predatory attacks on Messina and its neighborhood. He then took and fortified Messina, making it the base of his future operations, and being joined by Robert, the two, at the head of their small band, performed a variety of almost miraculous exploits. They were gradually joined by the Christian inhabitants, especially when their success had given the latter room to hope for freedom from their Moslem masters; and in 1072, Palermo, the capital and chief stronghold of the Saracens, was yielded to the invaders. Roger was then invested by his brother with the crown of Sicily, under the title of count; but it was not till 19 years afterward that he succeeded in thoroughly supplanting the Saracens, owing to the repeated re-enforcements they received from Africa. Roger had previously divided the country into fiefs, which he now distributed among his chief barons, whose relations to their subjects were regulated by him with justice and moderation. He had, in 1062, received from Robert his fair share of Calabria, to which, on the death of the latter, he added (1085) a number of towns wrested from Roger and Bohemond, Robert's two sons. He was now the chief of the Hauteville family; and the fame of his exploits, and the greatness of his power, made his alliance be courted by the first princes of Europe. It was at this time he took the title of "grand count," to distinguish him from his vassals; and in 1098, he received from pope Urban II., in recompense for his fidelity to the holy see, the privileges of refusing at his pleasure papal legates admission to his territory, and of appointing bishops. The last acts of his life were the building and endowing of churches and monasteries, among others the cathedral of Messina (1097). He died at Mileto in Calabria, July 11, 1101.

ROGER II., King of Sicily, second son of the preceding, was b. in 1097, four years before the death of his father. His elder brother Simon having died in 1102, he became the heir to the Sicilian throne: and during his minority, the government was administered by his mother, a princess of Montferrat. When Roger had taken the supreme authority into his own hands, his first care was to extend his estates. He compelled his cousin William to yield up the portions of Calabria and of the town of Palermo which Robert Guiscard had withheld from his father: and after the death of William (1127), he took possession of Apulia itself, obtaining his investiture in these new possessions (which were fiefs of the holy see) in the following year from Honorius II., who added to them that of the duchy of Naples. Ambitious of the title of king, he supported the faction of pope Anacletus, his wife's brother, and received from him the title of king of Sicily, with rights of suzerainty over the duchies of Naples and Capua—the former being a Lombardo-Italian, and the latter a Norman principality. In return, Roger established Anacletus on the pontifical throne in 1130; but the dispossessed pope, Innocent II., and the exiled princes of Capua and Naples, applied to the emperor Lothar, who stripped Roger of many of his acquisitions—the latter, however, recovering them almost the moment the German army had retired. At last, his bitter enemy, Innocent II., fell into his hands in 1139, and was compelled to withdraw the excommunications he had pronounced against Roger, and to consent to his retaining the territories he had acquired (excepting Naples), obtaining by these means not only his liberty, but the firm attachment of Roger to the holy see, and his own recognition as lawful pope. In 1141 he received from pope Lucius II. the right of using the staff, ring, tunic, miter, and other symbols of ecclesiastical dignity and power. In 1146 he revenged himself on the Greek emperor, who had been of the league with the pope and the emperor against him, by capturing Corfu, and pillaging Cephalonia, Negropont, Corinth, and Athens, returning to Sicily with an immense booty, including a number of workers in silk, by whom the silk-manufacture was first introduced into Sicily. He followed up these successes by the taking of Tripoli and other places on the African coast, and afterward attacking the Zeirides—leaving, at his death, an African dependency which stretched from Morocco to Kairwan. He died at Palermo Feb. 26, 1154. Roger was, like his father, prudent and resolute, skillful both in the cabinet and on the field; but he had neither the fine deportment nor the generous soul of the first Roger. His mind was capable of great scope and untiring energy, so that the real interests of his states were never overlooked, and the orderly system of taxation and government was a pattern to the rest of Europe. He cared nothing for the religion of his subjects—they might be heathens if they chose; but obedience to himself and respect to the laws were rigorously demanded and enforced. His fleet was supreme on the seas, and his court surpassed in magnificence that of every other prince in Europe. He spent many of his later years in rearing religious edifices on a scale of extreme magnificence, of some of which remains still exist.

ROGERS, HENRY, educated at Highbury for the Independent ministry, became professor of English literature in University college, London; resigned that post on his appointment to a theological professorship near Birmingham, and was appointed principal of the Lancashire Independent college in 1858. *The Eclipse of Faith* is his best-known book. *Reason and Faith* was published in 1866; *The Superhuman Origin of the Bible inferred from Itself,* in 1874. Rogers died Aug. 20, 1877.

ROGERS, HENRY DARWIN, LL.D., 1809–66; b. Philadelphia; professor of physics in Dickinson college, Carlisle, 1831; afterward for several years professor of geology, university of Pennsylvania; published, 1835, a report and geological map of New Jersey, and final report 1840; occupied in the survey of Pennsylvania 1836–56, and published annual reports, the last in two vols. 1858; appointed by the crown regius professor of geology and natural history in the university of Glasgow 1857, and chosen fellow of the Royal society of Edinburgh. He contributed many important papers to the *Transactions* of scientific associations, to the *Journal of Science,* and to the *New Philosophical Journal,* of which he was one of the editors; prepared a chart of the arctic regions in the *Physical Atlas*; and a geological atlas of the United States, with W. and A. K. Johnston of Edinburgh.

ROGERS, JAMES BLYTHE, 1803–52; b. Philadelphia; studied medicine at the university of Maryland. He held at various times the chair of chemistry at the Washington medical college in Baltimore, the Cincinnati medical college, the Franklin medical school in Philadelphia, and the university of Pennsylvania. He was assistant in the chemical and geological surveys of Virginia and Pennsylvania; published many scientific papers, and edited, with his brother, Robert Empie, Turner's *Chemistry.*

ROGERS, JOHN, 1505–55; b. England; was educated at Cambridge; ordained and appointed chaplain to the English merchants at Antwerp, remaining there several years. Meeting there Tyndale and Coverdale, he was led to renounce popery; became pastor of a Dutch church at Wittenberg. On the accession of Edward VI. he returned to England in 1548 by invitation of bishop Ridley, and became rector of St. Margaret Moyses and St. Sepulchre, in London, in 1550; in 1551 was made prebendary of St. Paul's, St. Pancras, and rector of Chigwell, and later, divinity reader. On the Sunday after the entrance of queen Mary into London in 1553 he preached at St. Paul's Cross, denounced popery, and urged upon the people a steadfast adherence to the doctrine's taught in king Edward's time. Summoned before the privy council, he ably defended himself and was released; but Aug. 18 he was ordered to remain a prisoner in his own house; after six months was removed to Newgate and treated with great severity. Jan., 1555, he was tried before Gardiner, bishop of Winchester, and condemned to be burned at Smithfield, Feb. 4. He compiled the first authorized English Bible, prepared from Tyndale's MSS., and Coverdale's translation, which was published under the name of Thomas Matthew: *The Byble in which is contained the Olde and Newe Testaments,* etc., by Thomas Matthew. Copies of it printed by Grafton and Whitchurch are in the British museum. In Fox's *Martyrology* are found an account of his examinations written while in prison, and other papers.

ROGERS, JOHN, 1565–1630; b. England; a Puritan; vicar of Hemmingham 1592; minister of Haverhill 1603. His publications were: *Sixty Memorials of a Godly Life; A Treatise of Love; The Doctrine of Faith; A Godly and Fruitful Exposition upon all the First Epistle of Peter.* These works were highly valued by the English Puritans. His son Nathaniel, educated at Cambridge; preached at Bocking and Assington, but was forced by persecution to leave for New England, where he was settled at Ipswich, Mass. He published a *Letter Discovering the Cause of God's Wrath against the Nation.*

ROGERS, JOHN, b. Salem, Mass., 1829; began life as a dry-goods clerk in Boston; went on a voyage to Spain; studied civil engineering, learned the trade of a machinist, and took charge of a railroad repair-shop at Hannibal, Mo., 1856; and modeled in clay. He went to Europe in 1858, returned in a year to Chicago, and entered a surveyor's office as draughtsman. In the same year he produced his "Slave Auction," and placed it on exhibition in New York. It at once caught the popular fancy and success was assured. His small groups in gray clay, illustrating scenes of the late war and rural incidents of a former period, have gained him great celebrity. He has a studio in New York, and has recently turned his attention to anatomical studies in the interest of art, and to garden and lawn statuary.

ROGERS, NATHANIEL PEABODY, 1794–1846; b. New Hampshire; graduated at Dartmouth college in 1816; studied and practiced law, but abandoned it in 1838 to edit the *Herald of Freedom,* an anti-slavery periodical, at Concord. He wrote for the *New York Tribune,* under the pseudonym of *The Old Man of the Mountain.* A volume of his fugitive pieces was published at Concord in 1847.

ROGERS, RANDOLPH, b. New York, 1825; studied art in Rome, where much of his life has been spent. Among his earlier works are his "Boy and Dog," and his statue of "Nydia, the Blind Girl of Pompeii." He designed the bronze door at the e. entrance of the rotunda of the capitol at Washington, finished Crawford's designs for the Washington monument at Richmond, and designed soldiers' monuments for the states of Michigan and Rhode Island. Among his works are statues of Ruth and Isaac, and a bronze statue of Lincoln at Philadelphia.

ROGERS, Richard, 1550–1618; b. England; preached as a Puritan minister in various towns of the kingdom for about 40 years, and held a high rank for his talents and his successful labors. He published *Seven Treatises*, a work greatly valued by Hooker and other ministers of New England.

ROGERS, Robert, 1730–1800; b. Dumbarton, N. H.; descendant of Irish pioneers. In 1755–63, during the French war, he was the daring leader of the famous Rogers's rangers. In 1758 he fought a bloody battle with the French and their Indian allies; his 170 men against 100 French soldiers and 600 Indians. When he was forced to retreat the French loss numbered 150, the American 100. In 1759, dispatched by gen. Amherst, he destroyed the Indian village of St. Francis. Indian loss, 200. In the following year he captured Detroit and other French posts, and went to England, published his journal, and was appointed gov. of Michilimackinac 1765. While holding that position he was arrested on suspicion of treasonable practices, and court-martialed in Montreal. In 1769 he went to England and thence to Algiers, and fought under the dey. During the revolutionary war he was twice arrested, and twice released on parole, dishonored his parole and recruited a company in the British army, called the queen's rangers, which he carried through the war. He published journals and reminiscences of the war.

ROGERS, Robert Empie, b. Baltimore, 1814; studied medicine at the university of Pennsylvania. In 1844 he was called to the chair of chemistry at the university of Virginia, where he remained till 1852, when he took the same position at the university of Pennsylvania, succeeding his brother, James Blythe. Soon afterward he was made dean of the medical faculty. He edited, with his brother, Turner's *Chemistry*, and has also edited Lehmann's *Physiological Chemistry*.

ROGERS, Samuel, an English poet, was b. in London, July 30, 1763. His father was a banker and member of a dissenting body. After having been carefully educated, Rogers was placed in his father's bank. His taste for literature and the company of literary men awoke at an early period, and he, accompanied by a friend, went one day to call on Dr. Johnson, who was then living at Bolt Court, but his courage failed him when his hand was on the knocker. In 1786, he published his first book, entitled *An Ode to Superstition, and some other Poems*. In 1792 he published his *Pleasures of Memory*—the work on which his fame most securely rests. For a considerable period after this he was silent. Meanwhile, he had retired from business, and in the possession of ample wealth, in his house in St. James's place, he employed himself with his muse, his cook, the company of the literary celebrities of his time, and the collecting of pictures and articles of *virtu*. Then, and during the whole period of his subsequent life, his breakfasts were more famous than his poems. Critics might find fault with the one, but not with the other.

In 1812 he published *Columbus*, a not very striking poetical fragment. In 1814 *Jacqueline* appeared in the same volume with Lord Byron's *Lara*. In 1819 he issued *Human Life;* and in 1822, *Italy*. An edition of the last work, illustrated by the best artists, at the cost, it is said, of £10,000, appeared in 1836. After this date he published nothing—his time being mainly devoted to taste, dining, epigram, and anecdote. Although aged, he was a greater gadder about than any man of his years in London. He rode or strolled in the parks, he haunted picture-galleries, he was a constant attender at the opera. He was by far the oldest English poet. An accident in the street at last confined him to his room, and on Dec. 18, 1855, he died, aged 93. He read Goldsmith's *Traveller* when it was published, and he might have read Tennyson's *Maud*. He published his first book before Burns's first volume appeared at Kilmarnock. Since his death Rogers's *Table Talk* has been published.

ROGERS, William Barton, b. Philadelphia, 1805, son of Dr. P. K. Rogers, brother of Dr. James Blythe, and Dr. Robert Empie; graduate of Harvard university, 1826. In 1827 he gave scientific lectures in the Maryland institute, and two years subsequently, on the retirement of his father, accepted the chair of natural philosophy and chemistry in William and Mary college. Of those sciences and that of geology he was prof. 1835–53, in the university of Virginia; and in the latter year removed to Boston. In 1835–42 he was at the head of the geological survey of the state of Virginia, which he organized, issuing reports in 6 volumes. He is an earnest promoter of scientific education among wage-workers, has contributed many valuable essays to the popular scientific journals, and has read lectures on special subjects before societies and institutes. He was president of the Massachusetts institute of technology, in Boston, 1862–68.

ROGET, Peter Mark, 1779–1869; b. London; studied medicine at the university of Edinburgh, and removed to Manchester, where he became physician to the lunatic asylum, the fever hospital, and the infirmary. He settled in London in 1808, and was long the secretary of the Royal society. Among his works are *Animal and Vegetable Physiology*, 1834; and a *Thesaurus of English Words and Phrases*, 1852. The last, which he deemed a minor work, has been found very useful.

ROGUE-MONEY is, in Scotland, an ancient assessment which the freeholders of every county at any of the head courts directed annually to be made in such sums as they judged necessary for defraying the expense of apprehending offenders, subsisting them in jail, and prosecuting them. The functions of the freeholder in the matter were trans ferred to the commissioners of supply by 2 and 3 Will. IV. c. 65, s. 44. The tax was first appointed by a statute of 11 Geo. II. c. 28. The raising and application of the tax are not uniform in the various counties.

ROHAN-GUÉMENÉE, Louis René Édouard, Prince de, 1734–1803, b. France; bred to the church, and made ambassador to Austria in 1772. He was recalled in 1774, having become offensive to Maria Theresa by his meddlesome spirit and the scandal caused by his luxurious mode of life. He became cardinal in 1778, and bishop of Strasburg the next year. He was imprisoned 1785–86 for his participation in the affair of the diamond necklace, and on his release was dismissed from court in disgrace. He was a deputy to the states-general in 1789, but resigned on account of accusations of disloyalty. He resigned the bishopric of Strasburg in 1801.

ROHILCUND, an extensive region in the n.w. provinces of India, lying w. of Oude, and named after the Rohillas, an Afghan tribe which migrated hither in the 18th century. As an administrative *division* (area, 11,805 sq.m; pop. '72, 5,436,314) it comprises the districts of Bijnur, Moradabad, Bareilly, Budaon, Shahjehanpur and Terai, and the protected state of Rampur.

ROHLFS, Gerhard, b. at Vegesack, near Bremen, in 1834; studied medicine at Heidelberg, Würzburg, and Göttingen; went to Algeria and entered the foreign legion of the French army. Having learned the Arabic language, he went in 1861 to Morocco, which he traversed, exploring the course of the wady Draa; traveled again in Morocco in 1864, and after a visit to Germany in 1865 he returned to Africa, spending two years in his travels. He received the medal of the Royal geographical society of London. In 1867, by order of the king of Prussia, he joined the English expedition against Abyssinia, and in 1873 he went with a party to explore the Libyan desert under the patronage of the khedive of Egypt. He visited the United States in 1875, and lectured on his travels. He has published several books of travel.

ROHTUK, a t. of British India, the capital of the district of the same name, in the division of Hissar, Punjab, 42 m. n.w. from Delhi. A canal or water-course, 45 m. long, constructed by order of the British government in 1825, supplies Rohtuk and the neighboring country with water from the great Feroze-shah canal. Pop. '68, 14,153.

ROKITANSKY, Karl, 1804–78; b. Bohemia; studied medicine at Prague and Vienna. In 1844 he was appointed professor of pathological anatomy at the university of Prague of which he became honorary rector in 1848. He was made rector of the university of Vienna in 1850, and resigned his professorship to 1874. His chief book is *Handbuch der pathologischen Anatomie* (1842–46). He was considered one of the first authorities on pathology.

RO'LAND, the hero of one of the most ancient and popular epics of early French or Frankish literature, was, according to tradition, the favorite nephew and captain of the emperor Charlemagne. All that history tells us of him is simply this: In 778, when Charlemagne was busily engaged at Paderborn in organizing the government of the recently subjugated pagan Saxons, and superintending their collective baptism and formal admission into the Christian church, he was visited by a Saracen chief, who, being unwilling to recognize the supremacy of the calif of Cordova, offered to put the Frankish sovereign in possession of several towns s. of the Pyrenees which were under his rule. Charlemagne, accepting the offer, marched with a numerous army through the territory of Gascony, whose duke, Loup, he constrained to do him homage, and took Pampelona and Saragossa. Finding, however, that his Saracen ally gave him but little aid, he turned back to return to France; and it was during this retreat, while the Christian army was slowly threading its way through the narrow valley of Roncevaux or Roncesvalles (q.v.), that Roland, commander of the marches of Bretagne, who commanded the rear-guard, was suddenly attacked by a large body of Vascons, lying in ambush in the surrounding woods, and slain while fighting gallantly. Beyond these meager details, all that we read of Roland is traditional. The oldest version of the *Song of Roland*, forming part of the *Chansons de Geste*, which treat of the achievements of Charlemagne and his paladins, belongs to the 11th c., although it is probable that the original compositions are not much later than the period to which they refer. Throughout the middle ages the *Song of Roland* was the most popular of the many heroic poems current, and William of Normandy, when on his way to conquer England, had it sung at the head of his troops, to encourage them on their march; while at the present day the traditionary memory of the heroic paladin is still held in honor by the hardy mountaineers of the Pyrenees, amongst whose dangerous defiles the scene of his exploits and death is laid. According to the poem, Charlemagne had been six years in Spain, when, resolving to return to France, he, by the advice of Roland, sent his captain, Ganelon, on an embassy to the pagan king Marsilius of Saragossa, to receive the homage which he had pledged himself to perform. The mission was a dangerous one, as all other ambassadors to the king had been slain, and Ganelon, wishing to revenge himself on Roland, proved a traitor, and betrayed to Marsilius the route which the Christian army were to take. The consequence was that, after Charlemagne had safely crossed the mountains with the main part of his forces, Roland, who commanded a rear-guard of 20,000 men, was surprised within the narrow valley of Roncesvalles by a terrible army of all the pagan nations of the world. Roland, who possessed an enchanted horn which could have been heard far beyond the mountains, might have recalled his uncle, but despising such pusillanimity, he fought on till 100,000 Saracens lay slain around him and the 50 warriors who alone remained alive to aid him. Another army of 50,000 men of Carthage, Ethiopia, and Candia now pours down upon him. At length he blows his horn, which is heard by Charlemagne, who, however, does not return, as Ganelon persuades him once, twice, and thrice that Roland is only hunting the deer; and not until the veins of Roland's neck have burst with the violence of the blast does the emperor retrace his steps. In the mean while Roland has dragged his dying limbs to the foot of Mt. Cisaire, above Roncesvalles, where, after having sung his death-song and thrown his trusty and enchanted sword Durandal into a poisoned stream, where it still remains, he dies exhausted from his many wounds. Charlemagne, who arrives too late to save him, avenges his death in a series of marvelous battles and bloody victories, whose delineation imparts a sufficiently dark coloring to the closing passages of this somber epic.

ROLAND DE LA PLATIERE, Jean Marie, a French minister of the revolutionary period, was born at Mizy, near Villefranche (Beaujolais), Feb. 18, 1734. His first independent appointment was that of inspector-ordinary at Amiens. In 1775, at the house of a friend in Amiens named Sophie Cannet, he met Marie Jeanne Phlipon, a young woman of brilliant genius and fascinating beauty, and after a courtship of four years, they were married Feb. 4, 1780. When the revolution broke out in 1789, Roland, as well as his wife, became a decided partisan of the movement. In 1791 he was sent to Paris, by the municipality of Lyons, to represent to the constituent assembly the deplorable condition of the Lyonnese weavers. After the dissolution of the constituent assembly, he founded at Lyons the *Club Central*, the members of which, marked by their attachment to constitutional liberty, received the name of *Rolandins*. Toward the close of 1791 he fixed himself at Paris, and soon became one of the heads of the Girondist or moderate section of the republicans. In March, 1792, he was appointed minister of the interior, a situation which he held till Jan., 1793, when he resigned it, despairing of seeing moderate counsels adopted. After placing his accounts in the hands of the assembly, he asked permission to withdraw from Paris, but it was refused, and an illegal attempt was made to arrest him, which failed. Immediately after, he fled, and concealed himself in Rouen. When news reached him of the execution of his wife, he committed suicide at a small village in the environs of Rouen, Nov. 15, 1793. Roland wrote and published several memoirs and disquisitions on branches of industry, besides 6 vols. of *Letters* addressed to his wife before their marriage, from Switzerland, Italy, Sicily, and Malta.

ROLAND, Madame (*née* Marie Jeanne Phlipon), wife of the preceding, was the daughter of Pierre Gratien Phlipon, an engraver, and was born at Paris, March 17, 1754. The precocity of her intelligence was remarkable. At the age of four, she had quite a passion for reading; at seven, she learned by heart a treatise on heraldry; at eight, she used to carry Plutarch with her to church, while the *Jerusalem Delivered* of Tasso, and the *Telemaque* of Fenelon fired her childish imagination. At the same time an ardent piety began to develop itself, and when only 11 she entered the *Maison des Dames de la Congrégation*, in the Faubourg Saint Marcel. Here she formed a close friendship with two young girls from Amiens, Henriette and Sophie Cannet, particularly with the latter, which was fruitful in consequences. On her return to her father's house after the lapse of two years, "a change came o'er the spirit of her dream." She no longer cared for the so-called "religious" writers—the defenders of the Bible and the church. Her faith was slowly changing from the dogmatic creed of Bossuet to the "naturalism" of the encyclopédists and "philosophes." In ethics, now as ever, her preference for the stoical system was marked. Shortly after the death of her mother in 1773 she read for the first time *La Nouvelle Héloïse*, which seemed to her (as it has to many another young impassioned soul) a veritable revelation. Greatly distressed by the imprudent conduct of her father, she again withdrew, at the age of 25, to the *Maison des Dames de la Congrégation*, and once more attempted an "austere" life; but M. Roland (q.v.), who had already known her for five years, now came forward, and rescued her from a career which must ultimately have proved equally unsatisfactory to her reason and conscience, by offering her his hand. She was 25, and he 45. There was certainly something unpoetical in the disparity of their years, but then, Mlle. Phlipon knew that "ideal" matches were made only in heaven, and so she accepted calmly the inspector of manufactures. Their marriage was celebrated Feb. 4, 1780. It is unnecessary to follow the remainder of her career, which was of course identical with her husband's until his flight from Paris May 31, 1793. The same night she was herself arrested, and imprisoned in the Abbaye. A more dauntless and intrepid spirit never entered its walls! Released on the 24th of June, she was instantly rearrested by the very commissaries who had set her at liberty, without the shadow of a tangible accusation, and confined in Saint Pelagie. Madame Roland spent the period of her imprisonment in study, in the composition of her political *Mémoires*. Summoned before the revolutionary tribunal in the beginning of Nov., she was condemned, and on the 9th was guillotined, amid the shoutings of an insensate mob. It is said that while standing on the scaffold, she asked for a pen and paper that she might write down the strange thoughts that were passing through her head." Only a genuine child of the French republic could have been so ostentatiously speculative at such a moment. Still more celebrated is her apostrophe to the statue of liberty, at the foot of which the scaffold was erected: "O Liberty, what crimes are committed in thy name!" or, according to another version, "Liberty, how they have played with thy name!"—See *La Correspondance de Madame Roland avec les Demoiselles Cannet* (2 vols. Paris, 1841); *Lettres Autographes de Madame Roland, adressées à Bancal des Issarts* (Paris, 1835).

ROLETTE, an unorganized co. in n. Dakota, adjoining British America; about 1800 sq. miles.

ROLL, a round molding much used in Gothic architecture. It is also modified by the introduction of a fillet, and is then called the roll-and-fillet molding.

ROLLER, *Coracias*, a genus of birds very generally referred to the crow family (*corvidæ*), but by many naturalists to the bee-eater family (*meropidæ*), with which they regard the habits and colors of the species as indicating a closer alliance. The bill is moderately large, compressed toward the point, straight, the upper mandible curved downward at the point, the sides bristled at the base, the gape wide; the legs short and strong; the wings long. The colors are in general very brilliant. Mr. Swainson says of the BLUE-BODIED ROLLER (*C. cyanogaster*) of western Africa, that "no effort of art can possibly do justice to those inimitably rich lines of ultramarine, beryl color, and changeable fawn, with which it is ornamented; for there are no tints hitherto discovered, either mineral or vegetable, which will enable the painter to produce their successful imitation." The species are pretty numerous, all natives of the old world, and mostly of the warmer parts of it. One only is found in Europe, the COMMON ROLLER (*C. garrula*), a bird nearly equal in size to a jay; with head, neck, and wing-coverts greenish-blue, other shades of blue strongly marked in the wings. This bird is abundant in the n. of Africa, and in some parts of Asia; it is partially migratory, and is rare in Britain. It tosses its food, which consists of insects or parts of plants, into the air before eating it, swallowing it when it falls in a proper direction for entering the throat. The name roller is derived from its habit of tumbling in the air like a tumbler-pigeon. It is an inhabitant of woods. It is a very shy bird, and the sportsman always finds it difficult to approach. In the countries where it is abundant, as in some islands of the Mediterranean, it is in high esteem for the table.

ROLLER, an agricultural implement which has been long in use, consisting of a cylinder of wood, stone, or iron, placed in a frame, so as to revolve like a wheel, and drawn over the land by a horse. The weight of the roller is greater or less according to the purpose for which it is intended: the breaking of stiff clay clods, the consolidating of very light soils after frost, the hardening of the surface of the ground to check evaporation, the leveling of an uneven surface before harvest operations, etc. For these and such purposes, the roller is in constant use. The introduction of hollow cylinders of iron, instead of solid ones of wood or stone, is an improvement of no remote date, and was the first change on the old simple implement, which was afterward further modified by dividing the cylinder into two parts, to give greater facility in turning, and to diminish its injurious action in scraping the soil before it while turning; and this process of division being carried further, with other modifications, giving each part or wheel a more independent action, and breaking up the uniformity of surface by giving a raised wedge-like edge to the circumference of each wheel, the result is a *clod-crusher*.

ROLLER, used as part of the inking apparatus in letter-press printing, is of modern invention. In the old process of applying the ink to the surface of types, stuffed leather balls were made use of, which were not only difficult to keep in proper order, but were inapplicable to cylinder-printing. The first improvement on the stuffed balls consisted in covering them with a soft and elastic composition, such as was employed in the Staffordshire potteries. Catching at this idea, the inventors of cylinder printing-machines made rollers by coating longitudinal and rounded pieces of wood with the composition, by means of casting in a mold. This invention came generally into use between 1814 and 1818, everywhere superseding balls, and rendering printing machinery practicable.

The method of making inking-rollers is very simple. A roller may be of any length, to suit work of different kinds; for hand-presses it is usually about 30 in. long, but longer for machines, according to their dimensions. The thickness is about 3 in., of which the composition on the wood is probably three-quarters of an inch all round. The wooden center being fixed upright in an iron mold, the composition is poured in when in a hot liquid state, and then left to cool. When cold, the mold, which is in halves, finely-jointed and held together, is opened, and the roller taken out: by a little trimming it is ready for use. The composition consists of a due proportion of fine glue and treacle or molasses, boiled together, and thoroughly blended—the result being a substance resembling soft india-rubber. The proportions of the two ingredients depend on the state of the atmosphere. In summer, one pound of glue to one pound of treacle may form a suitable mixture; but in winter it may be requisite to give three pounds of treacle to one pound of glue, in order to insure the proper elasticity. Rollers, in time, shrivel and waste by use, and the composition may then be remelted, along with some small addition of new materials. In all cases, the rollers require to be kept very clean, and suspended in a rack when not in use. The manufacture and supply of rollers for printers constitute a distinct business in London; but elsewhere, as far as we know, every printing establishment of any consequence possesses means of fabricating rollers for itself.

ROLLIN, Charles, a French historian, who formerly enjoyed, if he did not merit, an extensive popularity, was the son of a cutler, and was b. in Paris, Jan. 30, 1661. He studied at the college du Plessis, where, in 1683, he became assistant to the professor of rhetoric, and 4 years later obtained the chair for himself. In 1688 he was called to the chair of eloquence at the College Royal de France, and for some 10 years he discharged the duties of his office with remarkable zeal and success. In 1694 he was chosen rector of the university of Paris, a dignity which he held for two years, and signalized his brief tenure of office by many useful reforms, both in regard to discipline and study, and by his warm defense of the privileges of the university. His efforts to revive the study of Greek, then falling back into neglect, were particularly creditable to him, and altogether his career as rector constitutes perhaps his best claim to the regard of posterity, and has certainly left a more permanent impression than his writings, for its influence is perceptible even to the present day. In 1699 he was appointed coadjutor to the principal of the college of Beauvais; but was removed from this situation in 1712, through the machinations of the Jesuits, for Rollin was a strenuous Jansenist. For the next three years he devoted himself exclusively to learned study, the fruit of which was his edition of Quintilian (Paris, 2 vols. 1715). In 1720 he was re-elected rector of the university, and in 1726 published his *Traité des Etudes*, which M. Villemain has pronounced a monument of good sense and taste," and which is justly regarded as his best literary performance, for his *Histoire Ancienne* (Paris, 12 vols. 1730–38), though long prodigiously popular, and translated into several languages (the English among others), is feeble in its philosophy, jejune in its criticism, and often inaccurate in its narrative. Nevertheless, to multitudes, both in this country and in France, it has formed the introduction to the study of ancient history. Frederick the great, then the prince-royal, of Prussia, among other princely notabilities, wrote to compliment the author, and opened up a correspondence with him. In 1738 Rollin published his *Histoire Romaine* (Paris, 9 vols.), a much inferior work, now almost forgotten. He died Sept. 14, 1741.

ROLLIN, Ledru. See Ledru-Rollin, *ante*.

ROLLING-MILL, one of the most important of modern inventions for the working of metals. It was first introduced practically by Mr. Corb in 1784, and since then has gradually become more and more useful, as its capabilities have been developed. Under the article Iron (q.v.) there is a description of the iron rolling-mill, by means of which bars of iron are rolled or drawn out, and it will be at once seen that the same machine will do for other metals; moreover, the rolls may be engraved so as to impress a pattern on the bar as it passes through; this is done by the brass-workers to a great extent; and tubes of brass, copper, tin, etc., are also operated on in a similar way, a mandrel or rod of iron being fitted inside the tube, to sustain the pressure of the rollers.

ROLLO, or Rolf. See Normans, *ante*.

ROLL OF ARMS, a heraldic record of arms, either verbally blazoned or illuminated, or both, on a long strip of vellum, rolled up, instead of being folded into leaves. Rolls of arms are the most important and most authentic materials for the history of early heraldry. In England they go back to the reign of Henry III., the oldest being a copy of a roll of that reign, containing a list of the arms borne by the sovereign, the princes of the blood, and the principal barons and knights between 1216 and 1272, verbally blazoned without drawings. The original has been lost, but the copy, which, having been made by Glover, Somerset herald, in 1586, is called "Glover's Roll," is in the English college of arms. This roll exhibits heraldry as at that early period already consolidated into a system. In the British museum (Harl. Coll., 6,589) is a copy of another roll of the middle of the 13th c., containing 700 coats tricked, that is, drawn in pen and ink. The *Roll of Caerlaverock* is a heraldic poem in Norman-French, reciting the names and arms of the knights present at the siege of Caerlaverock in 1300. It has been published with notes by sir N. H. Nicolas. Copies exist of rolls of the knights who were with Edward I. at the battle of Falkirk.

ROLLS, Master of. See Master of the Rolls.

ROLLS OF COURT, in Scotch law, mean the list of causes depending in the court of session.

ROMAGNA. See Papal States.

ROMAGNO'SI, Gian Domenico, 1761–1835; b. Italy; appointed the superior civil magistrate of Trent. He was accused by the Austrians in 1799 of sympathizing with the French, and was arrested and tried on that charge, but acquitted. While in prison he discovered the deviation of the magnetic needle subjected to a galvanic current. He published an account of his discovery in 1802, but it excited little interest till the discoveries of Oersted some 20 years later. He was professor of law at Parma, Pavia, and Milan; was dismissed from his position at the latter on the downfall of Napoleon, and was once more acquitted of treason in 1818. His most important work is *Introduzione allo Studio del Diritto Pubblico Universale,* 1805.

ROMAINE, Rev. WILLIAM, an English divine of the last century, noted for the ardor with which he preached "evangelical" and Calvinistic doctrines in an age of religious apathy, was the son of a corn-dealer in Hartlepool, and was b. there, Sept. 25, 1714. His father was a French Protestant refugee. Young Romaine was educated at the grammar-school of Houghton. He was ordained a priest in 1738, and immediately obtained a curacy near Epsom. In 1739 he published a sermon preached before the university of Oxford, in which he attempted to show, in opposition to the view maintained by Warburton in his *Divine Legation of Moses*, that the doctrine of a future state is "expressly mentioned," and even "insisted on," in the Pentateuch. This led to a controversy with Warburton. In 1747 he published the first volume of a new edition of Calasio's *Hebrew Concordance and Lexicon*, the fruit of seven years' labor. The only thing in connection with Romaine's edition that now calls for notice is the fact that he took extraordinary liberties with the original, omitting, for example, the author's account of the word which is usually rendered "God," and substituting his own in the body of the work! In 1748 he was chosen lecturer of St. Botolph's, in London, and, in the following year, lecturer of St. Dunstan's-in-the-West. Two years later he was appointed assistant morning-preacher at St. George's; but was afterward deprived of the situation by the rector, Dr. Trebeck, who was jealous of his popularity, and averse to the "plainness" of his preaching. His "evangelicalism" grew with his years; and at length, in 1757, in a sermon on the *Lord Our Righteousness*, it became so offensive to the torpid dons of Oxford that the university pulpit was in future closed against him. Some years before this Romaine had been appointed to the professorship of astronomy in Gresham college, for which he was not fit, and which he did not retain. His intellect was anything but scientific in its character, as will readily be understood when we state that he allowed his "zeal" for Hutchinsonian speculations to lead him into opposition to the Newtonian philosophy. In 1756 he became curate and morning-preacher at St. Olave's, Southwark, a situation which he exchanged in the course of a year for a preachership at St. Bartholomew the Great, near West Smithfield. In 1766 he was chosen by the parishioners rector of St. Andrew, Wardrobe, and St. Anne, Blackfriars, an office which he held till his death, July 26, 1795. Besides what has been already mentioned, Romaine published *Twelve Sermons upon Solomon's Song* (1759); *Twelve Discourses upon the Law and the Gospel* (1760); *The Life of Faith* (1763); *The Scripture Doctrine of the Sacrament of the Lord's Supper* (1765); *The Walk of Faith* (1771); *An Essay on Psalmody* (1775); *The Triumph of Faith* (1795). His works were republished in a collected form, in 8 vols., in 1796, by the hon. and rev. W. B. Cadogan, who prefaced them with a life of their author.

ROMANA, PEDRO, CARO Y SUREDA, Marquis de la, 1761-1811; b. Majorca, of excellent family; entered the army at an early age. He was at first friendly to the French claims, but in 1808 when he learned that Jerome Bonaparte had been made king of Spain he transferred the forces which he had under his command in the island of Fünen to English ships of war. He had participated in the siege of Gibraltar, and had been placed in command of the army which Napoleon had forced Spain to raise. After Romana's rebellion against the tyranny of Napoleon, he went to London and induced England to assist Spain in her struggle against the French. In the war which followed he was commander-in-chief in the provinces of Biscay, Galicia, and Asturias, and organized the guerrilla warfare. He was eulogized by the duke of Wellington as "the finest ornament of the Spanish army."

ROMAN ALUM. See ROCH ALUM.

ROMAN ARCHITECTURE. Of the early architecture of Rome and the other Latin cities comparatively little is known. With the conquest of Carthage, Greece, and Egypt the Romans became acquainted with the arts of those countries, and began to endeavor to use them for the embellishment of the imperial city. Besides, Rome under the empire was the capital of the world, and attracted artists from every country. The result was that the architecture of Rome became a mixed style. It was all imported, and partook of the character of the importers. The great interest of Roman architecture is, that it is a mixture and amalgamation of all ancient styles, and the starting-point for all modern styles. It is thus the connecting link between ancient and modern art; the whole history of Roman architecture being that of a transition, slow but steady, from the external architecture of the Greeks to the internal architecture of the Christians. Rome borrowed from Greece the oblong peristylar temple, with its horizontal construction and decoration, and the various "orders." See COLUMN, GRECIAN ARCHITECTURE. From the Tuscans, probably, were derived the circular form of temple and the circular arch, which became leading features in the development of the future Roman style.

The *orders* imported from Greece were the Doric, Ionic, and Corinthian (q.v.). These were all used in Rome, but with some modifications; the Doric, for example, being never used as in Greece, but without fluting, and with the capital and entablature altered, and a base added, so as to make the style more similar to the others, with which it was often associated. The Ionic had the volutes turned out angularwise, so as to present a similar face in each direction. The favorite "order" of the Romans, however, was the Corinthian. It was invented in Greece, but more fully developed in Rome, where it suited the desire which existed for richness and luxuriance in architecture. Many fine examples of this style exist in Rome (as the pantheon, Jupiter Stator, etc.), and in the provinces (as the maison quarrée at Nêmes, Baalbec, etc.), the capitals, wherever found, being designed in endless variety. The composite order was an invention of the Romans, and is sometimes called *the Roman order*. It is a combination of the Ionic and Corinthian. All these orders were used by the Romans, but in a manner peculiar to themselves; they combined with the Greek orders the arch. They placed the columns at wide intervals, and set them on pedestals, to give them and the entablature a proper proportion; while behind the columns they placed square piers, and from them threw arches which supported the wall. This was the favorite Roman style, and may be seen in all their important works (amphitheaters, arches, baths, etc.). They piled one order above another, marking each story with the entablature. As the style proceeded, vaulting and arching became more common, especially in internal construction, but the horizontal ornamentation was never entirely abandoned. Arches of this construction were thrown from pillar to pillar behind the entablature, and gradually the pier was omitted, and the arch openly thrown from pillar to pillar, the architrave bent round it, and the cornice continued horizontally above.

The buildings executed by the Romans are very varied in their character, but the same style was used for temples, baths, amphitheaters, triumphal arches, tombs, etc. The earliest temples of which remains now exist are those of Jupiter Stator in the Forum, Jupiter Tonans, and Mars Ultor, all of the Augustan epoch, and each with only three columns left. These are supposed to have been nearly peripteral, and it is worthy of notice that the cells are all large, and one of them has an apse.

One of the most interesting temples of Rome is the pantheon. The portico is of the age of Augustus, but the rotunda is probably considerably later The dome of the interior is a splendid example of the progress of Roman architecture in developing the use of the arch, and transferring the decoration from the exterior to the interior. The former is in this case totally sacrificed to the latter; but the interior has not yet been surpassed for boldness of construction or simplicity and sublimity of effect. Other examples of circular temples, on a small scale, are found at Tivoli and in Rome, both dedicated to Vesta.

The greatest works of the Romans, however, were not their temples. The basilicas (q.v.), amphitheaters (q.v.), and baths (q.v.) are far more numerous and more stupendous as works of art, and all show how well the Romans had succeeded in producing an internal architecture, which at a later period became so useful as a model for Christian buildings. The basilica of Trajan is a type of the Christian wooden-roofed churches; while that of Maxentius with its great intersecting vaults, its vaulted aisles, and buttresses, contains the germs of the greatest Christian cathedrals. The Roman amphitheaters (q.v.) have never been surpassed for size and grandeur, or for suitability to their purpose. And of the baths (q.v.), sufficient remains still exist, although much decayed, from the perishable nature of the brick and stucco employed in their construction, to prove that the scarcely credible descriptions of contemporaries were surpassed by the magnificence of the buildings themselves.

Among the other varied public works of the Romans are their aqueducts (q.v.) and bridges, triumphal arches (q.v.), pillars of victory, and tombs. Of the tombs of the Romans, the earliest and best specimen is that of Cæcilia Metella (wife of Crassus), on the Appian Way. It consists (like most Roman tombs) of a round drum placed on a square basement, and was probably surmounted by a conical roof. The tomb of Augustus was similar, on a very large scale, and the sloping roof was broken into terraces planted with trees. That of Adrian (now the castle of St. Angelo in Rome) is another enormous example. The tombs were generally ranged along the ways leading to the gates of cities.

The later tombs of Rome are well worthy of study, as they contain many specimens of the transition toward the Christian style. They are generally vaulted, frequently with domes, as, for instance, the tombs of St. Helena and Sta. Costanza. Mr. Fergusson also places the so-called "temple of Minerva Medica" among the tombs. It is a beautifully arranged building with ten sides, all containing deep niches (except the side with the door), surmounted by a clear-story, with ten well-proportioned windows. The vault is polygonal inside and outside; and the pendentives, ribs, buttresses, etc., which played so important a part in the Christian architecture both of the east and west, are distinctly used in its construction.

Of the domestic architecture of the Romans, we have many wonderfully preserved specimens in Herculaneum and Pompeii, showing both the arrangements and decorations of the dwellings of all classes. Of the great palaces and villas, however, none remain except the palace of Diocletian, at Spalatro, in Dalmatia. It is an important building, as it shows many steps in the progress of the style.

ROMAN CATHOLIC CHURCH, the community of Christians throughout the world who recognize the spiritual supremacy of the pope or bishop of Rome, and are united together by the profession of the same faith, and the participation of the same sacraments. The subject will be most conveniently treated by considering under separate heads the history of this great Christian community; its doctrinal and disciplinary system; and finally, its organization and constitutional forms, especially as affected by the decrees of the late council of the Vatican, and by other doctrinal constitutions of recent years.

Although a few other points of doctrinal difference separate the Roman church from the Greek, Russian, and oriental communions, yet the most palpable ground of division lies in the claim of supremacy in spiritual jurisdiction on the part of the Roman bishop. The history of the Roman church, therefore, in relation to the ancient oriental churches, is, in fact, the history of this claim to supremacy. In the minds of Roman Catholics, the claim of supremacy on the part of the bishop of Rome rests on the belief that Christ conferred on Peter a "primacy of jurisdiction"; that Peter fixed his see and died at Rome (a position which some Protestant historians have called in question altogether); and thus, that the bishops of Rome, as successors of Peter, have succeeded to his prerogatives of supremacy. In this light Catholic historians read the facts of the early history of the church—and they trace to this acknowledgment of the superiority of that see, the numerous references to Rome on matters of doctrine or discipline; the appeals from other churches, even those of Alexandria, Antioch, and Constantinople; the depositions or nominations of bishops, examination and condemnation of heresies, of which the first five centuries, especially the 4th and 5th, present examples, but in which Protestant historians only recognize the natural result of the political and social superiority of Rome as the capital of the Roman empire. The letters of pope Leo the great show beyond question that the bishops of Rome, in the commencement of the 5th c., claimed to speak and act with supreme authority; and the first direct challenge to this claim was made by the patriarch of Constantinople, Acacius, and led to a schism of many years, which, however, terminated in the humiliation of the younger see. In all the controversies upon the incarnation—the Arian, the Nestorian, the Eutychian, the Monothelite—not only was the orthodoxy of Rome never impeached, but she even supplied at every crisis a rallying point for the orthodox of every church. It was so, again, in the Iconoclast controversy; and although Constantinople, in the time of Gregory the great and again of Nicholas I., renewed the struggle for supremacy, or even equality, the superior position of Rome continued to be recognized. The separation of the Greek church and her dependencies, under the patriarch Michael Cerularius in the year 1054, was but a narrowing of the territorial jurisdiction of Rome; and within that portion of the church which remained faithful, it even enhanced the dignity of Rome, and widened her prerogatives. The abandonment of Italy by the emperors to its fate under the invasion of the barbarians, led to the establishment of the temporal sovereignty of the popes; and the social disorganization of Europe combined with the spiritual authority of the Roman bishop to bring about the general recognition of his authority throughout the kingdoms of Europe as an arbiter in the temporal relations of sovereigns with their subjects, and of sovereigns toward each other. This extraordinary temporal authority was at once the consequence and the support of his acknowledged spiritual power; and even Protestants have recognized the Roman church of the mediæval period as absorbing in itself almost the whole of European Christendom, and as the only public (even though they believe it degenerate and corrupt) representative of the church in the west. The temporary withdrawal of the papal residence from Rome to Avignon brought with it a notable diminution, at least, of the temporal power of the popes, which was still further weakened by the long western schism, by the conflicts of the rival pontiffs, and the scandals which arose therefrom. The modern political institutions which then began to break upon the world so modified the public relations of church and state as by degrees to undo the condition of society in which the temporal power of the popes had its foundation. The great revolution of the 16th c. completed the process.

Nor was the revolution with which the popes thus found themselves face to face without its influence in the external history of the Roman church. The defections consequent on the reformation, and at first numerous and formidable, received a check. The great council of Trent did more to systematize, to define, and to present in popular form the doctrinal belief of Rome than had been accomplished by the united efforts of the schoolmen of the three centuries which preceded the reformation; while the decrees of reformation which it enacted, and still more the schemes of local and individual reform which it originated, and to which it gave the impulse as well as the example, tended to bring about an active internal reform. The latter half of the 16th c. was a period of new life in the Roman church. The celebration of local synods, the establishment of episcopal seminaries, the organization of schools, and other provision for religious instruction—above all, the foundation of active religious orders of both sexes—had the effect of arresting the progress of Protestantism, which in many countries had been at first rapid and decisive; and lord Macaulay has traced out with curious minuteness the line which marks in the several kingdoms the origin and the progress of this religious reaction.

From the end of the 16th c., therefore, the position of the Roman Catholic church, especially in her external relations, may be regarded as settled. The local distribution of the rival churches in the world has hardly been altered, except by migration, since that time. But in her relations to the state, the Roman church has since passed through a long and critical struggle, which is detailed under the heads GALLICAN CHURCH,

Febronianism, **Innocent XI**. The new theories to which the French revolution gave currency have still further modified these relations; but in most of the European kingdoms they were readjusted after 1815, either by concordat or by some similar mutual agreement. Many conflicting claims on either side, however, still exist; but in the conflict with the state the policy of the Roman Catholic church has generally been to record her protest against any violation of her right, and, this protest having been made, to submit under protest, unless in what are considered the essentials of faith or of discipline. Where the encroachments of the state are considered to violate the essentials of faith or discipline, the resistance must result in definitive separation, as in the case of England under Henry VIII. and his successors, in Poland under the czar, and in Prussia in the now pending conflict.

The details of the doctrinal system of the Roman Catholic church will be best collected and explained from her latest authentic creed, that commonly called "the creed of Pius V.," drawn up as a summary of the authoritative teaching of that ecclesiastical body till the time at which it was written, and published together with certain later doctrinal pronouncements. It is only necessary to premise that, while in the view of Catholics (see **Rule of Faith**) all doctrine must be based on the word of God, written or unwritten, the church is the only authoritative judge of that rule of faith. The tribunals which are held to represent this teaching, as well as the subjects to which the privilege extends, and the limits within which it is held to be exercised infallibly, have all been explained under the head **Infallibility** (q.v.). But Catholics hold that while the church has authority, when doubts or difficulties arise, to propound in such terms as leave no room for doubt new definitions of faith, nevertheless these new definitions must not be regarded as additions to the accepted faith of the church, or indeed to the original deposit of divine teaching, but only as expositions of former articles, or at most as developments of what already existed in the germ, and has but been evolved by controversy, or brought into practical action by the progress of time, and by the change of the external relations of the church. The creed of Pius V. is as follows:

"I, N. N., with a firm faith believe and profess all and every one of those things which are contained in that creed which the holy Roman church maketh use of. To wit: I believe in one God, the Father Almighty, Maker of heaver and earth, of all things visible and invisible, and in one Lord Jesus Christ, the only-begotton Son of God, born of the Father before all ages; God of God; Light of Light; true God of the true God; begotten, not made; consubstantial with the Father, by whom all things were made. Who for us men, and for our salvation, came down from heaven, and was incarnate by the Holy Ghost of the Virgin Mary, and was made man. He was crucified also for us under Pontius Pilate, suffered, and was buried. And the third day he rose again according to the Scriptures: he ascended into heaven, sitteth at the right hand of the Father, and shall come again with glory to judge the living and the dead; of whose kingdom there shall be no end. I believe in the Holy Ghost, the Lord and life-giver, who proceedeth from the Father and the Son; who, together with the Father and the Son, is adored and glorified; who spake by the prophets. And in one holy, Catholic, and apostolic church. I confess one baptism for the remission of sins; and I look for the resurrection of the dead, and the life of the world to come. Amen.

"I most steadfastly admit and embrace the apostolical and ecclesiastical traditions, and all other observances and constitutions of the same church.

"I also admit the holy Scriptures, according to that sense which our holy mother the church hath held and doth hold; to whom it belongeth to judge of the true sense and interpretation of the Scriptures; neither will I ever take and interpret them otherwise than according to the unanimous consent of the fathers.

"I also profess that there are truly and properly seven sacraments of the new law, instituted by Jesus Christ, our Lord, and necessary for the salvation of mankind, though not all for every one: to wit—baptism, confirmation, the eucharist, penance, extreme unction, order, and matrimony; and that they confer grace; and that of these baptism, confirmation, and order cannot be repeated without sacrilege. I also receive and admit the received and approved ceremonies of the Catholic church, used in the solemn administration of the aforesaid sacraments.

"I embrace and receive all and every one of the things which have been defined and declared in the holy council of Trent concerning original sin and justification.

"I profess, likewise, that in the mass there is offered to God a true, proper, and propitiatory sacrifice for the living and the dead; and that in the most holy sacrament of the eucharist there is truly, really, and substantially the body and blood, together with the soul and divinity of our Lord Jesus Christ; and that there is made a conversion of the whole substance of the bread into the body, and of the whole substance of the wine into the blood; which conversion the Catholic church calleth transubstantiation. I also confess that under either kind alone Christ is received whole and entire, and a true sacrament.

"I constantly hold that there is a purgatory, and that the souls therein detained are helped by the suffrages of the faithful.

"Likewise, that the saints reigning together with Christ are to be honored and invocated, and that they offer prayers to God for us, and that their relics are to be had in veneration.

"I most firmly assert that the images of Christ, of the mother of God, ever virgin, and also of other saints, ought to be had and retained, and that due honor and veneration are to be given them.

"I also affirm that the power of indulgences was left by Christ in the church, and that the use of them is most wholesome to Christian people.

"I acknowledge the holy Catholic, apostolic, Roman church for the mother and mistress of all churches; and I promise true obedience to the bishop of Rome, successor of St, Peter, prince of the apostles, and vicar of Jesus Christ.

"I likewise undoubtingly receive and profess all other things delivered, defined, and declared, particularly by the holy council of Trent; and I condemn, reject, and anathematize all things contrary thereto, and all heresies which the church hath condemned, rejected, and anathematized.

"I, N. N., do at this present freely profess, and sincerely hold this true Catholic faith, out of which no one can be saved; and I promise most constantly to retain and confess the same entire and inviolate, by God's assistance, to the end of my life."

In addition to these articles, the Roman Catholic church has, since the compilation of the creed of Pius V., defined certain further doctrines in the controversy on grace, which arose from the teaching of Jansenius (q.v.); still more recently that of the immaculate conception of the blessed Virgin Mary (q.v.); and a still more comprehensive body of articles in the memorable *Syllabus* issued by pope Pius IX., and in the decrees of the Vatican council, celebrated under the presidency of the same pontiff. The doctrinal decisions of this latter council are divided into two sections, the first, "on the Catholic faith," the second "on the church of Christ." Each section contains a "scheme of doctrine," in which the heads of belief, and the grounds on which they rest, are explained; and to each is appended a body of "canons," in which the several points are summarized, stated in precise theological language, and defined as articles of Catholic belief. In the scheme "upon the church of Christ" are contained, in "an additional chapter," the celebrated declarations regarding the infallibility of the pope. See *Omnium Concilii Vaticani Documentorum Collectio* (8vo, Paderborniæ, 1873).

The details of the discipline of the Roman Catholic church would be out of place here. But it may be observed that the Roman Catholic church leans toward asceticism, as regards the practice of fasting, with less rigor than the Greek and oriental communions; while, on the contrary, as to the celibacy of the clergy (q.v.), her law is much more stringent; all the clergy of the Roman Catholic church in the greater orders, including sub-deacons, being so strictly bound to celibacy that a marriage contracted after ordination is invalid by the church law. See ORDERS. In all that regards the general discipline of the whole church, only the pope or a general council is considered to have power to legislate; national or provincial synods for the discipline of a kingdom or province, and bishops for that of their own dioceses.

The constitution of the Roman Catholic church has been in great part explained in the article HIERARCHY. It may be necessary to add that, under the generic name Roman Catholics are comprised all those Christians who acknowledge the supremacy of the Roman pontiff, even though they be not of the Roman or Latin rite (q.v.). Not a few individuals and churches of other rites are included under this designation, Greeks, Slavonians, Ruthenians, Syrians (including Maronites), Copts, and Armenians; and these communities are permitted to retain their own national liturgy and language, and for the most part their established discipline and usages. The most remarkable examples of the diversity of discipline thus introduced under the common rule of the Roman pontiff are the retention in the east of the use of the cup for the laity, and the permission of the marriage of the clergy.

As regards its organization for the purposes of ecclesiastical government, the normal territorial distribution of the Roman Catholic church of the several rites in the various countries where it exists is into provinces, which are subject to archbishops, and are subdivided into bishoprics, each governed by its own bishop. The total number of archbishops of the several rites in communion with Rome in 1875 was 177, or whom 12 bore the title of patriarch. The number of bishops was 712. But in certain parts of the world, where the population and government are Protestant or unbelieving, the spiritual affairs of the Catholic church are directed, not by bishops with local titles, but by bishops *in partibus infidelium* (q.v.), who are styled vicars of the pope, or vicars-apostolic. The full number of archbishops and bishops in 1875, including those *retired* and those with sees *in partibus infidelium*, was 1103.

The statistics of the Roman Catholic church, as contained in the *Orbe Cattolico*, published at Rome, gives us the total number of Catholics of all nations as 185,000,000. This number nearly corresponds with the total of Roman Catholics as given in the article on religion (q.v.). In order to avoid unnecessary repetition, we refer to that article for the details of the distribution of Roman Catholics in the several countries; and for the number of those subjects of the pope who follow a rite different from that of Rome, see GREEK CHURCH, RUSSIAN CHURCH, SYRIA, MARONITES.

ROMAN CATHOLIC CHURCH (*ante*) in the United States has a complete organization extending over the whole country, which it divides, ecclesiastically, into 12 provinces, containing 61 dioceses, and 9 vicariates-apostolic; in subjection to the spiritual government of the pope, administered through 1 cardinal, 13 archbishops, 62 bishops, and 6,494 priests. It has 8,158 churches, chapels, and stations where religious services are held; a very large number of "institutions" established for religious, literary, benevolent, and other ecclesiastical purposes; and a system of parochial schools attended probably by 500,000 children. Its own estimates of "Catholic population" throughout the country make an aggregate of 6,225,000.

ROMAN CATHOLIC EMANCIPATION or RELIEF ACTS. After the reformation, both in England and in Scotland, Roman Catholics were subjected to many penal regulations and restrictions. As late as 1780 the law of England—which, however, was not always rigidly enforced—made it felony in a foreign Roman Catholic priest, and high treason in one who was a native of the kingdom to teach the doctrines or perform divine service according to the rites of his church. Roman Catholics were debarred from acquiring land by purchase. Persons educated abroad in the Roman Catholic faith were declared incapable of succeeding to real property, and their estates were forfeited to the next Protestant heir. A son or other nearest relation, being a Protestant, was empowered to take possession of the estate of his Roman Catholic father or other kinsman during his life. A Roman Catholic was disqualified from undertaking the guardianship even of Roman Catholic children. Roman Catholics were excluded from the legal profession, and it was presumed that a Protestant lawyer who married a Roman Catholic had adopted the faith of his wife. It was a capital offense for a Roman Catholic priest to celebrate a marriage between a Protestant and Roman Catholic. Such was the state of the law, not only in England but in Ireland, where the large majority of the population adhered to the old faith. In Scotland, also, Roman Catholics were prohibited from purchasing or taking by succession landed property. The inexpediency and irrationality of imposing fetters of this description on persons not suspected of disloyalty, and from whom danger was no longer apprehended, began about 1778 to occupy the attention of liberal-minded statesmen; and in 1780 sir George Saville introduced a bill for the repeal of some of the most severe disqualifications in the case of such Roman Catholics as would submit to a proposed test. This test included an oath of allegiance to the sovereign, and abjuration of the pretender, a declaration of disbelief in the several doctrines, that it is lawful to put individuals to death on pretense of their being heretics; that no faith is to be kept with heretics; that princes excommunicated may be deposed or put to death; and that the pope is entitled to any temporal jurisdiction within the realm. The bill, from the operation of which Scotland was exempted, eventually passed into law. An attempt which had been made at the same time to obtain a like measure of relief for the Roman Catholics of Scotland was defeated by an outburst of religious fanaticism. The populace of Edinburgh, stirred up by a body called "the committee for the Protestant interest," attacked and set fire to the Roman Catholic churches, and the houses of the clergy and of such persons as were suspected to be favorable to Roman Catholic relief. The frenzy spread to England, where a "Protestant association" had been formed to oppose the resolutions of the legislature. See GORDON, LORD GEORGE. In 1791 a bill was passed affording further relief to such Roman Catholics as would sign a protest against the temporal power of the pope, and his authority to release from civil obligations; and in the following year, by the statute 33 Geo. III. c. 44, the most highly penal of the restrictions bearing on the Scottish Roman Catholics were removed without opposition, a form of oath and declaration being prescribed, on taking which they could freely purchase or inherit landed property.

Endeavors were made at the same time by the Irish parliament to get rid of the more important disqualifications, and place Ireland on an equality in point of religious freedom with England. In 1780 Grattan carried his resolution that the king and parliament of Ireland could alone make laws that would bind the Irish, and separation from England was urged as the alternative with repeal of the disqualifying statutes. The agitation culminated in the Irish rebellion of 1798; the union of 1800 followed, which was partly carried by means of pledges, not redeemed, regarding the removal of the disabilities in question. Meantime, in England, Roman Catholics continued subject to many minor disabilities, which the above-mentioned acts failed to remove. They were excluded from sitting and voting in parliament, and from enjoying numerous offices, franchises, and civil rights, by the requirement of signing the declaration against transubstantiation, the invocation of saints, and the sacrifice of the mass. In the early part of this century many measures were proposed for the removal of these disqualifications, and in 1813 and succeeding years, one bill after another for this end was thrown out. Meanwhile, the agitation on the subject among the Roman Catholics themselves greatly increased, and in 1824 it assumed an organized shape by the formation of the "Roman Catholic association" in Ireland, with its systematic collections for the "Catholic rent." The duke of Wellington, who, for a long time, felt great repugnance to admit the Roman Catholic claims, was at last brought to the conviction that the security of the empire would be imperiled by further resisting them, and in 1829 a measure was introduced by the duke's ministry for Catholic emancipation. An act having been first passed for the suppression of the Roman Catholic association—which had already voted its own dissolution—the celebrated Roman Catholic relief bill was introduced by Mr. Peel in the house of commons on Mar. 5, and after passing both houses, received the royal assent April 13. By this act (10 Geo. IV. c. 7), an oath is substituted for the oaths of allegiance, supremacy, and abjuration, on taking which Roman Catholics may sit or vote in either house of parliament, and be admitted to most other offices from which they were before excluded. They, however, continue to be excluded from the offices of guardian and justice or regent of the United Kingdom, lord chancellor, lord keeper, or lord commissioner of the great seal of Great Britain or Ireland, and lord high commissioner to the general assembly of the church of Scotland. As members of corporations, they cannot vote in the disposal of church property or patronage. Ecclesiastics or other members of the Roman Catholic persuasion, either wearing the habit of their order, or officiating in any place which is not their usual place of worship, or a private house, forfeit £50. Jesuits, and members of orders bound by monastic or religious vows, must register themselves with the clerk of the peace of their county, under a penalty of £50 for every month that they remain in the kingdom unregistered. Jesuits not natural-born subjects, who have come into the country since the passing of the act, are liable to be banished. Persons admitting others to such societies within the United Kingdom are liable to fine and imprisonment, and those who have been so admitted are liable to be banished.

Restrictions which existed on Roman Catholic bequests were removed by 2 and 3 Will. IV. c. 115, as regards Great Britain, and by 7 and 8 Vict. c. 60, with relation to Ireland. Acts 7 and 8 Vict. c. 102, and 9 and 10 Vict. c. 59, abolished a few minor Roman Catholic disabilities. For the statutory prohibition against the assumption of ecclesiastical titles in respect of places in the United Kingdom, see ECCLESIASTICAL TITLES ASSUMPTION ACT.

ROMAN CEMENT. See CEMENTS.

ROMANESQUE ARCHITECTURE, the debased style which succeeded Roman architecture, from about the time of Constantine (350 A.D.) to that of Charlemagne (800 A.D.). It is impossible to fix the date of the style definitely, because Roman architecture (q.v.) was itself a transitional style, and the one fades gradually into the other. When Constantine proclaimed Christianity the religion of the empire, he gave the Christians freedom of action. They could worship in public, and consequently desired buildings for their service; hence the impetus which gave architecture a new start. As explained under APSE and BASILICA, the Christians adopted the Roman hall of justice for their church or place of assembly, and erected many noble basilicas in Rome, Ravenna, and all over the empire. These consisted of three or five aisled halls—the aisles separated by rows of columns. In Rome the columns, entablatures, and other ornaments were frequently taken from the ruins of ancient buildings which abounded there. The new style is therefore closely allied to the ancient one in the imperial city; but in Ravenna, Jerusalem, Provence, and the remoter districts, where few ancient remains exist, a simpler and ruder copy of the ancient work is found. There is always, however, a certain resemblance to the old forms which distinguishes the Romanesque from the round-arched Gothic which succeeded it. The piers along the isles are always single columns, generally with caps intended to be Corinthian, and wide arches; the aisles are wide, with open wooden roof; and there are remnants of entablatures, moldings, etc., which recall the ancient Roman work. The early Christians also derived their round churches from the Romans. They were probably originally tombs, copied from such buildings as the Minerva Medica (see ROMAN ARCHITECTURE), and were the most sacred places where the burial-service was said and the sacraments administered. Hence they afterward became baptisteries (q.v.), and were finally absorbed into the church (see RHENISH ARCHITECTURE), which then contained within itself everything connected with the Christian service.

In Rome there are still some thirty basilicas, and the Romanesque style may be said never to have died out there. As we recede from the center, we find its influence gradually weaken and succumb to the northern Gothic style. Thus in Lombardy and Provence it was superseded by the Lombard (q.v.) and Romance styles in the 11th and 12th centuries, while in Byzantium and the east it gave way to the Byzantian style about the time of Justinian. Among the finest examples remaining are St. Paul's (see BASILICA) and Sta Maria Maggiore at Rome, and at Ravenna St. Apollinare, the interior decoration of which last is very beautiful. The mosaics of the apse, the painted walls, and the inlaid pavements of the Romanesque churches are among their finest features. In color they always excel.

In Tuscany there is a late form of Romanesque, of which the cathedrals at Pisa and Lucca, San Miniato at Florence, and many churches in those cities are examples. They are intermediate specimens, built during the 11th c., when the cities became prosperous, and have a certain amount of Gothic feeling; but although beautiful in colored decoration, they have not the simple grandeur of the early basilicas; and although more decorated externally than these, they have not the bold and purpose-like appearance of Gothic elevations.

ROMAN'IA, or RUMANIA (often written ROUMANIA). See the article MOLDAVIA AND WALLACHIA, to which this short notice serves as a continuation and conclusion. A military revolt took place in Feb., 1866, which resulted in the deposition of prince Couza—Alexander John I. The count of Flanders, younger brother of Leopold II. of Belgium, was unanimously chosen hospodar; but he at once declined the perilous honor. Upon this the choice of the Romanians fell upon prince Charles of Hohenzollern-Sigmaringen, who was proclaimed prince of Romania on April 20, 1866. The existing constitution was then adopted. When war broke out between Russia and Turkey in April, 1877, Romania signed a convention with Russia, guaranteeing the Russian troops a free passage through Romanian territory; and on May 21 the chamber of deputies at Bucharest decreed the independence of Romania. War was declared with Turkey, and the Romanian army bore a creditable part in several battles, especially before Plevna. The Berlin congress of 1878, which revised the treaty of San Stefano concluded between Russia and Turkey, and has attempted the most recent solution of the "eastern question," agreed to recognize the independence of Romania. It resolved, however, much against the will of the government and people of Romania, to restore to Russia the portions of Bessarabia (q.v.) touching the Pruth and Danube, which were given by the treaty of Paris to Moldavia in 1856; and, by a rough sort of compensation, Romania received the Dobrudscha (q.v.), bounded on the s. by a line from Silistria to Mangalia. It was stipulated that difference of religious profession should not disqualify from the exercise of full civil and political rights in Romania.

ROMAN'IC LANGUAGES, a general name for those modern languages that are the immediate descendants of the language of ancient Rome. In those parts of the empire in which the Roman dominion and civil institutions had been most completely established, the native languages were speedily and completely supplanted by that of the conquerors—the Latin. This was the case in Italy itself, in the Spanish peninsula, in Gaul or France, including parts of Switzerland, and in Dacia (see under MOLDAVIA). When the Roman empire was broken up by the irruptions of the northern nations (in the 5th and 6th centuries), the intruding tribes stood to the Romanized inhabitants in the relation of a ruling caste to a subject population. The dominant Germans continued for several centuries to use their native tongue among themselves; but from the first they seem to have acknowledged the supremacy of the Latin for civil and ecclesiastical purposes, and at last the language of the rulers was merged in that of their subjects, not, however, without leaving decided traces of the struggle—traces chiefly visible in the intrusion of numerous German words, and in the mutilation of the grammatical forms or inflections of the ancient Latin, and the substitution therefor of prepositions and auxiliary verbs. It is also to be borne in mind that the language which underwent this change was not the classical Latin of literature, but a popular Roman language (*lingua Romana rustica*) which had been used by the side of the classical, and differed from it—not to the extent of being radically and grammatically another tongue, as some writers unwarrantably conclude—but chiefly by slovenly pronunciation, the neglect or misuse of grammatical forms, and the use of "low" and unusual words and idioms. As distinguished from the old *lingua Latina*, the language of the church, the school, and the law, this newly-formed language of ordinary intercourse in its various dialects was known as the *lingua Romana;* and from this name, probably through the adverb romanicé, came the term romance (Prov. and O. Fr. *romans*, Sp. *romance*, It. *romanzo*), applied both to the language and to the popular poetry written in it, more especially to the dialect and productions of the troubadours in the south of France.

According to the theory of Raynouard (q.v.), the new language that sprang out of the corruption of the Latin was at first essentially the same over all the countries in which Latin had been spoken, and is preserved to us in a pure state in the Provençal or language of the troubadours; and it was from this as a common ground, and not from the original Latin, that the several Neo-Latin tongues diverged into the different forms which they now present. This theory is not accepted by more recent inquirers; its groundlessness has been demonstrated by sir G. Cornewall Lewis in his elaborate *Essay on the Origin and Formation of the Romance Languages* (2d ed. Lond. 1862). It is beyond doubt that the several daughters of the mother Latin had their characteristic differences from the very first, as, indeed, was inevitable. The original Latin spoken in the several provinces of the Roman empire must have had very different degrees of purity, and the corruptions in one region must have differed from those in another according to the nature of the superseded tongues. To these differences in the fundamental Latin must be added those of the superadded German element, consisting chiefly in the variety of dialects spoken by the invading nations and the different proportions of the conquering population to the conquered. French, e.g., as was to be expected, is richer in German words than any other member of the family, having 450 not found in the others. Italian is next to French in this respect. There are about 900 in the Romanic languages altogether, of which about 300 are common to them all. A great many of these words are terms relating to warfare.

The varieties of speech originating in the way now described (which first received the general name of Romanic* languages in recent times from German scholars—*Romanische Sprachen*) are divided by Diez into six jurisdictions:

1. The Italian, preserving, as was to be expected, the traits of the mother Latin in more recognizable form than any of the sister tongues. It presents a variety of strongly marked dialects.

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* *Romanic* seems preferable to *romance*, the term employed by many English writers, both as being more in analogy with *Italic*, *Arabic*, etc., and as avoiding the association with a particular kind of literature, and the special Neo-Latin tongue in which that literature was originally written, viz., the Provençal.

2. The Wallachian (see under MOLDAVIA).
3. The Spanish, which is characterized by copiousness and etymological obscurity, arising from the establishment of so many different nations on the soil. For one element of difference it contains a large number of Arabic words—as many as 500 terms have been enumerated. Of the various dialects the Castilian is considered the standard.
4. The Portuguese, including both the language of Portugal and of Galicia; it is nearly akin to the Spanish, but differs too much in some points of grammar to be reckoned a mere dialect.
5. Provençal, the language of the south of France, extending on the one side into Spain over Catalonia, Valencia, and the Balearic isles; and on the other over Savoy and part of Switzerland, about the lake of Geneva. The line of division between the Provençal and the northern idiom which has now become the literary language of the whole of France, is usually drawn through Dauphiné, Lyonnais, Auvergne, Limousin, Perigord, and Saintonge. From the use of the affirmative *oc* (= yes), the Provençal was known as the Langue d'oc, as the northern French was called the Langue d'oil, from *oïl*, modern French *oui* (see LANGUEDOC).* The Provençal was at an early period a cultivated language, with a regular system of grammar, and in the 12th and 13th centuries produced a rich poetical literature (see TROUBADOURS).
6. French, extending over the northern half of France, and parts of Belgium and Switzerland. Diez conceives that at first northern French may have been little different from Provençal, but beginning with the 9th c. it has been more and more distinguished by the greater wearing away of the original grammatical forms. See FRENCH LANGUAGE AND LITERATURE.

The language of the canton of the Grisons (q.v.), anciently *Rhætia*, though sufficiently distinct from Italian and French, is not considered by Diez to have attained sufficient fixity or independence to deserve being ranked along with the others as a seventh Romanic tongue. It is called by the Germans Cur-wälsch, by the people themselves Rumonsh. There are two chief dialects, the Oberland, about the sources of the Rhine, and that spoken in the Engadine (q.v.), called the Ladin.

The chief authorities on this subject are the two great works of Diez (q.v.), the grammar and the dictionary of the Romanic languages. The dictionary and the introduction to the grammar have been translated into English.

ROMAN LAW. See LAW, CIVIL.

ROMANOFF, HOUSE OF, of which the present imperial family of Russia is the chief representative, is said to have derived its origin from a Lithuanian prince of the 4th c.; but however this may be, it is certain that the family did not make its appearance in Russia till the 14th c., when Andrew Kobyla emigrated from Prussia to Moscow in 1341 and entered the service of the then grand-duke, Simeon the fierce. Andrew's descendants became bojars early in the 15th c., their territorities lying in the government of Vladimir and district of Jurief-Polskoi. The bojar *Roman Jurievitch*, the fifth in direct descent from Andrew, died in 1543, leaving a son and daughter, the latter of whom became czarina by her marriage with Ivan the terrible; while the former, *Nikita Romanovitch Jurief*, by his nuptials with the princess of Susdal (a direct descendant from a brother of St. Alexander Nevskoi), was also allied to the royal race of Rurik. Nikita was one of the regency during the minority of Feodor I.; and his eldest son Feodor, under the name of *Philarete*, was elevated to the rank of archimandrite and metropolitan of Rostof during the reign of the false Dmitri. The Romanoffs supported that party who tendered the Russian crown to the Polish prince, and Philareté had gone with that view to Poland, when a sudden outburst of national sentiment put a stop to these negotiations, and the unlucky envoy was in consequence thrown into prison by the enraged Poles. The national party now proceeded to the election of a native sovereign, who should be as closely allied as possible by blood to the race of Rurik; and after much hesitation and many rejections they chose MIKAIL FEODOROVITCH ROMANOFF, the son of the imprisoned metropolitan, and the representative, through his grandmother, of the royal house of Rurik, Feb. 21, 1613. This selection, which had been made by the higher nobility and the clergy, was rapturously applauded by the people; and though the new czar was not quite seventeen years of age, the general desire of all classes to conform to his ordinances rendered the cares of government comparatively light. He was succeeded by his eldest son, *Alexei Mikailovitch* (1648–76), an able prince, who carried on war with varied success against the Swedes and Poles, and acquired a great reputation as a legislator. Alexei was twice married, and left by his first wife two sons, Feodor and Ivan, and many daughters, and by his second wife one son, Peter. His eldest son *Feodor* (1676–82), was a prince of much talent and foresight, and labored with success to reduce the power of the aristocracy; but being of a very weak constitution he died at the age of twenty-five without posterity, leaving the throne by his will to his half-brother, Peter, as his full brother, Ivan, was an imbecile. However, it was not till seven years after this that *Peter* (see PETER THE GREAT) succeeded in obtaining possession of the throne.

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* Instead of the etymologies of *oc* and *oïl* given in the article referred to, Diez derives *oc* from Lat. *hoc*, this (equivalent to Eng. *so*, Ital. and Fr. *si*, which are only other forms of the pronoun [q.v.] *sa* or *ta*); in the north *oc* was first shortened into *o*, and then compounded with *il* (Lat. *hoc illud*).

It is worthy of remark that hitherto all the czars of the house of Romanoff had mounted the throne before attaining twenty years of age. Peter (see Peter the Great) was twice married; by his first marriage he had a son, Alexis (q.v.), who died during his father's lifetime, leaving one son, Peter, afterward Peter II.; and by his second marriage with *Catharine I.* (q.v.) (1725–27) he had two daughters, Anne and Elizabeth. Catharine I. left the throne to her step-grandson, *Peter II.* (1727–30), the last of the male line of Romanoffs; and on his death without heirs the succession reverted to the female line. Ivan, Peter the great's half-brother, had also left daughters, and their claims to the crown being preferable, one of them, *Anna Ivanovna* (1730–40), was placed upon the throne, and was succeeded by her grand-nephew, *Ivan IV.* (1740–41); but then a revolution drove Ivan's family from the throne, of which the cadet female line in the person of *Elizabeth* (1741–61), the daughter of Peter the great and Catharine, obtained possession. Failing heirs of Elizabeth, her nephew Peter, the son of her elder sister Anna Petrovna, who had married the duke of Holstein-Gottorp (a cadet of the family of Oldenburg), and died in 1728, was the heir-presumptive; and accordingly, on her death in 1761, he mounted the throne as *Peter III.* (1761–62), founding a new dynasty, that of Romanoff-Oldenburg; but his brief tenure of power was put an end to by his assassination at the instigation of his wife, the princess Sophia-Augusta of Anhalt-Zerbst, who as Catharine II. (1762–96) wielded the scepter of this mighty empire for the long period of thirty-four years. She was succeeded by *Paul I.* (q.v.) (1796–1801), her only son by Peter III.; and Paul after a brief reign was also assassinated, leaving several sons, the eldest of whom was *Alexander I.* (1801–25); but as he left no issue, the crown at his death devolved by right upon his next brother, Constantine. Constantine had, however, in compliance with the wish of his elder brother, previously relinquished his claims to the supreme power, and the third brother, *Nicholas I.* (1825–55) in consequence ascended the throne. Nicholas left at his death four sons and several daughters, and his eldest son, *Alexander II.* (1855) is the present czar.

ROMAN RELIGION, Ancient, a conglomeration of the most widely-different theological or rather mythological elements, introduced by the various strata of immigrations that flowed into the different parts of Italy at different prehistoric times. It was chiefly under Greek influence that it assumed that most characteristic and systematic form, under which it was known during the classical times of Rome, and as which it generally represents itself to our minds. Numa Pompilius (q.v.), that mythic successor of Romulus, is by the primitive legend mentioned as the founder of the Roman religion, or rather ceremonial law. He is probably the type of the period when the religious notions of the Sabines were first joined to the primitive elements of legendary belief of the early settlers. Among the vast number of the different and obscure component elements, the Pelasgian, Sabellian, Oscan, Gallic, etc., out of which grew the recognized state religion, we can, with a comparative amount of clearness, distinguish chiefly three—the Etruscan, the Sabine, and the Latin. The religion of the Etruscans—as distinct from the Pelasgians (q.v.)—has been characterized in our article on that nation. Of the gods of the Latins, many are closely related to those of the Greeks (see Greek Religion), a circumstance easily accounted for by their common eastern origin (see Rome, History of); others, however, seem indigenous. Their principal deities are Tellus (q.v.) (the earth), Saturn (q.v.) (god of seeds), and his wife Ops (goddess of earth and plenty), who are somewhat akin to Kronos and Rhea; Jupiter (q.v.), with Juno (q.v.), givers of light. Deities more peculiar to the Latins are Janus (q.v.), and Diana (q.v.). Faunus and Fauna are prophesying wood-deities, and were allied to Lupercus, in whose honor the Lupercalia (q.v.) were celebrated; Picus and Pilumnus, who preside in some way over agriculture and the fruits of the field; Vesta (q.v.); Fortuna (q.v.); Ferentina, the goddess of leagues. A certain number of agrarian deities (Anna Perenna, Venus, etc.) make up, with those mentioned, the bulk of "native" Latin numina. Of chiefly Sabine deities, we name Feronia, the Ferentina of the Latins, a goddess of the soil, who was worshiped with gifts of flowers and fruits; and the two war-gods, Mars and Quirinus—the former a deity at first worshiped under the symbol of shield and spear, and of high importance for colonizations, to whom every animal and every human being born in a certain year was sacred: the former being doomed to be sacrificed, and the latter at the age of twenty to emigrate, and to found new settlements: Quirinus, a deity of strife, closely connected with the myth of Romulus. Sabine deities were also Sol, the sun, Luna, the moon, etc.

Having thus traced some of the principal gods and goddesses (of the greater part of whom fuller information will be found in special articles in the course of this work) to the respective nationality that first introduced them into Italy, we shall now take a brief glance at the Roman pantheon as it appeared when it had embodied systematically these acclimatized primeval idealizations. For it was as characteristic of the Roman gods to appear in sets, as it was for the more personal gods of the Hellenes to appear singly. The Romans, as it were, made them fall rationally into rank and file, each with a distinct mission of its own, and thus filled with them, as with authorities over special departments, the whole visible and invisible world—above, below, and around. The first rank of all is taken by the three Capitoline deities, the personifications of highest power, highest womanliness, and highest wisdom—Jupiter (q.v.), Juno (q.v.), the queen of heaven, and the tutelary deity of women; and Minerva (q.v.). The stars also had three foremost representatives—Sol, the sun, Luna, the moon, and Tellus, the earth. The supreme deities of the infernal regions were Orcus, Dis (Dives, Consus?), and his wife, the queen of the empire of the shadows, Libitina. The element of the water was presided over by Neptune (q.v.); that of the fire by Vulcan (q.v.), the god of the smithies, and Vesta, the goddess of the domestic hearth and its pure flame. Agriculture and rearing cattle were sacred to the ancient Latin king Saturnus, whose wife, Ops—the riches therefrom accruing—had, like Demeter, her seat in the soil. Ceres, Liber, and Libera, the three Greek deities of agricultural pursuits, were superadded about 500 B.C. Pales, the special protector of the flocks, and his festival (the Palilia) were celebrated on the foundation-day of Rome. Mars himself was the supreme deity of the Romans next to Jupiter. Deities of oracles are Faunus, a deified king, who gave his obscure decisions either in dreams or in strange voices, and his female relative—wife, daughter, or sister—Fauna (Bona Dea), who attends only to the female sex; and the Camenæ, prophesying nymphs, of whose number was Egeria, Numa Pompilius's inspirer. The Apollo worship was but of late growth in Rome. The Parcæ represented the unchangeable fate of the individual. Fortuna was, on the contrary, the uncertain chance of destiny, the "luck" to be invoked at all important junctures. Salus, Pax, Concordia, Libertas, Felicitas, Pietas, Virtus, Honos, Spes, and a host of other abstract notions, explain themselves. Venus first became important when identified with Aphrodite; in the same way as Amor, Cupido, and Voluptas were Greek importations, brought into prominence by the poets chiefly. Life, death, and life after death are made concrete, by the Genii, the Lares, Manes, and Penates. See LARES.

Like the Greeks, the early Romans had no "mediators," but addressed their prayers and supplications directly to the individual god. The priesthood, we find, in the classical period, had arisen originally from the "kindlers (*flamines*) of Mars," or those who presented burnt-offerings to the early Italian war-god Mars, and the twelve dancers (*salii*) who in March performed war-dances in his honor. To these came the "Field Brethren," the "Wolf-repellers," etc.; and thus by degrees an endless and most powerful hierarchy came to be built up. By the side of it, but not identical with it, were certain sacred colleges, who kept the sacred traditions alive, and who were the supreme authority on religious observances. These were the colleges of Pontifices (q.v.) or Bridge-builders, of Augurs (see AUGURIES and AUSPICES), the keepers of the Sibylline books (see SIBYL); the twenty Fetiales or state heralds, the supreme—advising, not executing—authorities on international law; the Vestal virgins, on whom devolved the guardianship of the Palladium and of the sacred fire; the Salii (see above), and others. Priests, in the stricter sense of the word, in the service of special deities, were the Flamens (q.v.); while the Dea Dia, the goddess of fields (Tellus, Ceres, Ops, Flora), had the special brotherhood of the twelve Arvalian brothers, with their numerous followers. The state sacrifice, before the expulsion of the mythical kings supposed to have been offered up by these, was offered by a special *rex sacrorum* or *rex sacrificulus*.

The mode of worship was analogous to that of the Greeks. Votive offerings, prayers, vows, sacrifices, libations, purifications, banquets, lays, songs, dances, and games made up the sum of their divine service. The sacred places were either *fana*, *delubra*—mere hallowed spots on hills and in groves—or *templa*, *ædes*, special buildings dedicated to a special deity. The latter contained two altars—the *ara*, for libations and oblations; and the *altare*, for burnt offerings chiefly. Frugality, as it pervaded, in the classical period, the domestic life, so it also prevented all extravagance of offerings to the deity, and all excess of rejoicing before it. Sober and dull, as the Roman religion undoubtedly was—for it never once expanded into the joyful extravagances of fancy with which the Greek religion was fraught throughout—it at the same time kept free from the abominations that are the natural offspring of that unbounded sway of fancy. Human sacrifices, as far as they are to be met with, grew out of the idea of substitution, and were chiefly enthusiastic voluntary acts of men who threw themselves into the breach; or they carried out decrees of civil tribunals, who had convicted the "victim" of a deadly offense. In their dealings with the gods, the Romans were pure merchants, carrying out their promises with strict literalness, and thus often fraudulently, against the patent inner meaning of their promise; but the gods were not to them the all-pervading essences, but rather creditors, strict and powerful, yet unable to exact more than was agreed upon outwardly.

A code of moral and ethical rules, furthering and preserving civil order, and the pious relations within the state and family, were the palpable results of this religion, which, in its barrenness of metaphysical notions, did next to nothing for the furtherance of art.

And here we must enter somewhat more fully into that peculiar phenomenon of the utter dissimilarity in the characters of the Greek and Roman religion, at which we have hinted already—a dissimilarity all the more surprising, as the self-same symbolical and allegorical views of nature, filtered through however different channels, form the foundation of both. Both also—especially in their later stages—offer a general analogy not only of deities and spirits, but even of holy places and their mode of worship. But the fact is that they each took the originally common stock of notions and conceptions, clad more or less in mythical garb, and utterly transformed it, superadding to it from time to time according to their own distinct nationality. It is here, however, that their characteristic traits come out in as forcible a contrast as they do in every other relation of life, in their art and culture, in their states and families. While to the Hellenes the individual was the chief end of all things, and the state existed for the citizen, and the ideal was the *Kalokagathia*, the beautiful, good, the Romans imposed, as the highest duty, submission to authority—the son to the father, the citizen to the ruler, and all to the gods. To them, only that which was useful appeared good. Idleness was not to be tolerated in a community where every single member only existed as far as it contributed to the greatness and aggrandizement of the commonwealth. Hence, with them, a rational thoughtfulness, and a grand and awful austerity in their relations to men and gods; while the Greeks treated both with joyful serenity. The Greek invested his gods with human attributes, and then surrounded them with a halo of highest splendor and most glorious divine beauty; but he constantly modeled and remodeled them, until they reached the acme of beautiful perfection, as would the painter and the sculptor with their work. The Roman, on the other hand, cared nothing for the outward form of his idealized notions—the notions themselves, mere fundamental ideas, were his sole object of veneration. The Greeks made everything concrete, corporeal, and individual; the Romans, abstract and general. The Greeks could only worship allegories; the Romans, abstractions. Hence, also, their utter discarding of many of the myths common to the whole Indo Germanic stock, the unmarried and childless state of their gods, who, moreover, wanted no food, and did not wander about among men, as did the Indian and the Hellenic. As in the late Midrash, which has partly found its way into Christianity, there is a heavenly Jerusalem right over the earthly Jerusalem, in which all things below were reproduced in an exact but most ideal and divine manner. Thus, the Roman pantheon was the precise counterpart of the Roman world as it existed in reality. Every man, and thing, and event, and act had a corresponding tutelary diety, that came and went with the special individual, phenomenon, or event; and eternal gods were those only that represented certain great unchanging laws of nature. The angels of the legendary lore of later Judaism and early Christianity, that protect special nations, were with the Romans the gods of these nations, and entered, as their special numina, the divine commonwealth of the Romans simultaneously with the admission of these nations into their own pale or freedom.

As long as the grand old Roman simplicity of manners, the frugality of domestic life, the indefatigable pursuit of agriculture, trade, and commerce lasted—and all of these were well characterized by the deep reverence paid to gods (albeit not in the highest scale of divine order), who presided over the house, the field, the forest, mercantile enterprise, and the like, Vesta, the Penates, the Silvani, the Lares or Lases, Hercules or Herculus (a native Italian deity, the god of the inclosed homestead [compare Jupiter *herceus*] apparently distinct from the Greek Heracles), as the god of property and gain, whose altar, as god of faith (*Deus fidius*), was as frequently to be met with as those of the goddess of chance (Fors, Fortuna), and the god of traffic (Mercury)—so long did Roman religion, properly so called, retain its firm hold over the people's minds, and its influence cannot well be overrated. But when the antique austerity, the olden spirit of grand independence, the unceasing hard work that steeled body and soul, had given way to the lazy luxurious ease of later times—then Roman religion ceased to exist in reality, and over its ruins rose a mad jumble of unbelief, Hellenism, sectarianism, and oriental creeds. The ancient *religio*, the binding faith, which had excited the admiration and astonishment of the Greeks, had waned, and in proportion with the unbelief rose the pomp, and stateliness, and luxury of public worship. To the hierarchy of augurs, oracle-keepers, and pontifices were superadded special banquet-masters for the divine banquets. The priests more and more freed themselves from taxes and other public burdens, and the custom of perpetual endowments for religious objects crept in, as their influence waxed stronger and stronger. "Pious services" became as much an item of domestic expenditure as cook's and nurse's wages. Penny collections for the "mother of God" were gathered on certain fixed days by the sound of fife and drum played by priests in oriental garb, headed by a eunuch, from house to house, and the whole substance of Roman faith was transformed into an unwieldy mass of dark, groveling mysticism and shameless profligacy, presided over by wretched gangs of uneducated and unprincipled priests. How this state of things favored the gradual introduction of Judaism and Christianity into the dying days of imperial Rome, has been briefly sketched in Gnostics (q.v.). Constantine the great abolished the last outward trace of Roman religion by proclaiming Christianity as the state religion.—For the greater part of the gods and goddesses mentioned, see special articles. See also GREEK RELIGION, ETRURIA, PELASGIANS, etc. For a fuller account of the whole subject, the reader is referred to Mommsen's *History of Rome* (Eng. transl. Lond. 1864).

ROMANS, a t. of France, in the department of Drome, stands on the right bank of the Isère, 14 m. n.e. of Valence. A bridge, founded in the 9th c., connects Romans with the small town of Peage on the left bank of the river. Romans owes its origin to an important abbey, founded in the 9th c., by St. Bernard, archbishop of Vienne, and by a nobleman named Romain, who gave his name to the town. Silk and woolen fabrics are largely manufactured, and a very active general trade is carried on. Pop. '72, 9,898; '76, 11,024.

ROMANS, EPISTLE TO THE, in a doctrinal point of view, the most profound and elaborate composition of St. Paul. That it proceeded from the pen of the great apostle of the Gentiles has never been seriously doubted by any competent scholar. Much discussion has taken place regarding the *composition* of the church at Rome, and—connected therewith—the design or object of the epistle. Were the members of the church Jewish or Gentile Christians? The general opinion of commentators is that the church was a mixed congregation, the majority of members being probably of pure Gentile descent, and the minority Jewish Christians, who perhaps formed the original nucleus of the church. Dr. Jowett, in his *Epistles of St. Paul to the Romans, Galatians, and Thessalonians*, suggests that the phenomena of the text—for example, the frequent appeals to the authority of the "law" addressed to the Gentiles—may be best explained on the hypothesis that the apostle is speaking to a Gentile congregation which had passed through a phase of Jewish proselytism. The great value of the Epistle to the Romans consists in this, that it exhibits what may be called the *rationale* of Christianity. The immediate object of the apostle was probably nothing more than to prevent an outbreak in the church at Rome of those violent antipathies of religious sentiment which had shown themselves elsewhere (for instance, at Corinth), and had produced such disastrous consequences; but with a view to the more complete accomplishment of this object, he takes a broad *ethical* view of human nature, and finds all men—Jews and Gentiles alike—to be estranged from God, and in need of pardon and reconciliation. He does not underrate the advantages which his Jewish countrymen possessed—nay, he extols them; but he points out at the same time that the "oracles" or "law" could not make the Jews holy: they could only condemn them for being unholy. The Gentiles were declared guilty not less decisively by their own consciences—the law was plainly enough "written in their hearts." Hence Paul's grand argument, that if men are to stand as "righteous" in the sight of God, it cannot be by their "works," but in virtue of a divine justification graciously vouchsafed to them, and received into their hearts by an act of faith. This leads him to unfold the purpose and significance of Christ's work, to dilate on the "freeness" of God's grace toward "sinners." He concludes by predicting the conversion of his "kinsmen according to the flesh," exhorting the Gentiles to humility, charity, mutual forbearance, and the practice of all the Christian virtues. The epistle is believed to have been written from Corinth during Paul's third missionary journey, about 58 A.D. The commentaries upon it, or upon special chapters, are innumerable; and almost all the great doctrinal controversies that have agitated Christendom owe their origin to it.

ROMANS, EPISTLE TO THE (*ante*), opens with affirming, 1. That the gospel is of divine authority, and had been promised in the Old Testament; 2. That in the person of Jesus Christ the divine and human natures are united; 3. That the righteousness of God by faith which is revealed in the gospel makes it the power of God unto salvation. I. This proposition begins the doctrinal part of the epistle, which shows, 1. That all men need God's way of salvation. (1.) The Gentiles, having sufficient light by nature to render them without excuse for transgression, manifest their depravity in flagrant vices. (2) The Jews pronounce their own condemnation when, doing the same things for which they condemn others, they boast in the law, which forbids sin, and in the Scriptures, which affirm the universal prevalence of transgression. Jews and Gentiles, therefore, being sinners, no man can be saved by the deeds of the law. 2. God offers all men salvation through the death of Christ. This provision had been foretold from the beginning, and even Abraham had been saved through faith in it. 3. The results of justification by faith are: peace with God, access into a state of grace, a joyful hope of glory, present joy even in tribulation as promoting growth of Christian character, and assurance that since the love of God had been exercised toward sinners in giving Christ to die for them, much more by his living again would the blessings of salvation be secured. These blessings are great and abounding, being, as coming through the righteousness of one man, analogous to the ruin which had come on mankind through the transgression of one man; yet far transcending that. 4. This grace to sinners does not tolerate sin, but insures its destruction in all who truly believe. The very profession of reliance on Christ is a promise to forsake sin; and the exercise of faith in him, is the beginning of a new life which is to be perfected in holiness. Yet sin does not die easily, or soon. A conflict between the old nature and the new is waged, often with increasing strenuousness in proportion as the new grows strong, so that believers, if depending on themselves, would be in despair; but through Christ their deliverance is sure. 5. Therefore to true believers there are present manifold blessings: release from condemnation, spiritual life, adoption as children of God, joint-heirship with Christ in all that belongs to God, even though as creatures they still continue, in common with others, subject to the vanity of the present life; yet they have the sure hope of being saved from it, and of their creature nature attaining the glorious liberty of God's children. In the mean time, the spirit of God dwelling in them helps their infirmities; all external things, they know, are so administered as to work together for good to them; and the love of God, which did not spare his own son, will triumph for them and in them over all actual and possible hostile things. 6. To this doctrinal exhibition an objection of great apparent force is urged. The Jews, through whom historically the one way of salvation in the gospel has been manifested to men, are, as a nation, unbelievers in their own Messiah, and consequently, are rejected of God. Paul admits the fact, declaring that he endured great and constant sorrow for them as his kinsmen according to the flesh whose case had once been his own when, in his ignorant unbelief, he used to imprecate on himself a curse from Christ: he recounts their ancient privileges and honors, yet declares that God's supreme purpose. itself a part of a universal plan, having from the beginning respect to a portion of the people, had been accomplished; that the rejection of the unbelieving portion will not be perpetual, because ultimately they shall become a believing people; and that, as through their unbelief salvation had gone out to the Gentiles, so, in the fullness of time, their faith and restoration will be to the world as life from the dead. II. The practical part of the epistle flows logically from the doctrinal exhibition.

ROMANSH or RUMONSH. See ROMANIC LANGUAGES, *ante*.

ROMANS, KING OF THE, strictly the title of the prince elected during the lifetime of a German emperor to be his successor. The title expired with the Holy Roman Empire in 1806. Up to the time of the coronation of Otho I. by pope John XII. in 962, the German sovereigns called themselves kings of Germany, and also (though incorrectly) kings of the Romans. Joseph II. was the last to bear the title.

ROMANTIC SCHOOL, the name first assumed in Germany, about the beginning of the present century, by a number of young poets and critics, A. W. and Fr. Schlegel, Novalis, Ludwig Tieck, Wackenroder, etc., who wished to indicate by the designation that they sought the essence of art and poetry in the wonderful and fantastic—elements that pre-eminently characterized the Romance literature of the middle ages. Their efforts were directed to the overthrow of the artificial rhetoric and unimaginative pedantry of the French school of poetry, even then influential, and to the restoration of a belief in the mystery and wonder that envelop the existence of man—a belief that had been rudely assailed and mocked by the prevailing materialism in all departments of thought. Thus, their purpose was twofold—it was in part æsthetic, and in part religious. As poetical reformers, the Romantic school in Germany unquestionably exercised a most beneficial influence; but as religionists—though their aim was intrinsically high and noble—they more or less consciously subserved the designs of a reactionary government, and so came to be hated and distrusted by the liberal politicians and thinkers of Germany.—See Eichendorff's *Ueber die Ethische und Religiöse Bedeutung der Neuern Romantischen Poesie* (Leip. 1847); H. Heine's *Zur Geschichte der Neuern Schönen Literatur in Deutschland* (Hamb. 1833); Hettner's *Die Romantische Schule* (1850); R. Haym's *Die Romantische Schule* (1870); and the Danish work of Brandes (1878).—Between twenty and thirty years later a similar school arose in France, and had a long struggle for supremacy with the older classic school. It was victorious, but not wise, and, except in a few instances—such as Lamartine and Victor Hugo—it has rushed into excesses of caprice both literary and moral, which have stamped it with a revolutionary rather than a reformatory character.—Seen Huber's *Die Romantische Poesie in Frankreich* (1832); Tenuet's *Prosodie de l'École Moderne* (1844); Gautier's *Histoire du Romantisme* (Par. 1874).

ROMAN WALL. Traces are found in Great Britain of four great walls built by the Roman conquerors. Two were built by Agricola, the first in A.D. 79, and the second in A.D. 81, extending from the frith of Forth to the frith of Clyde. As this proved insufficient to keep back the northern barbarians, Hadrian in A.D. 120 finished the most famous of all the walls, from the Solway to Newcastle on the Tyne. This was 68 English m. in length. In A.D. 209 Severus built another wall a few yards above that of Hadrian, which was guarded by 10,000 men.

ROME. The design of this article is to furnish the reader with a brief outline of the ETHNOLOGY and HISTORY of ancient Italy, in so far as these are not already discussed or described under particular heads, to which reference will be made. As the Roman state gradually conquered and incorporated with itself the other states and territories of the Italian peninsula, and as these (in general) figure separately in history only during the process of this subjugation, it will be most convenient to consider them here.

Ethnology.—In the earliest times we find in Italy *five* distinct races; three of which (IAPYGIANS, ETRUSCANS, and ITALIANS) may, in a restricted sense, be termed "native," inasmuch as we do not meet with them elsewhere; and two, GREEKS and GAULS, "foreign;" inasmuch as their chief settlements were not in Italy, but in Greece and Gallia. But, ethnologically, this distinction is arbitrary. There is no reason for believing that the first three races were indigenous, and the last two immigrant; the analysis of their languages, or of such fragments of their languages as survive, leads strongly to the conclusion that all were alike immigrant, and that in this respect the only difference between them is one of *time*.—1. *The Iapygians.*—This race, monuments of which in a peculiar language (as yet undeciphered), have been found in the s.e. corner of Italy—the Messapian or Calabrian peninsula—is in all probability the oldest.—2. *Etruscans.*—The origin of this mysterious people is certainly one of the most interesting, if also one of the most insoluble problems in history. It is not, however, necessary to say anything about them here, as their history, character, and civilization are handled at length in the article ETRURIA.—3. *Italians.*—At what period the earliest immigrations into Italy of the so-called "Italian" races—the Latins and Umbro-Sabellians, took place, it is wholly impossible to tell; but it was undoubtedly long before the Etruscans had settled in Etruria. They were by far the most important of the various races that inhabited the peninsula; in fact, the entire historical significance of Italy depends upon them; and therefore it is fortunate that their ethnological origin and affinities are capable of the most certain demonstration. An investigation of their language, subdivided indeed into numerous dialects, often widely differing but fundamentally the same, has resulted in the discovery that they belong to the great Aryan or Indo-Germanic family (see ARYAN RACE and ARYAN LANGUAGES), and are in particular closely allied to the Hellenes. We are therefore warranted in affirming that at some very remote period a race migrated from the east, embracing the ancestors of both Greeks and Italians. By what route they proceeded, or at what point they diverged, we can only conjecture, for the problem is not yet solved whether the Hellenes reached Greece by way of Asia Minor or from the regions of the Danube; but, at any rate, Mommsen's statement that "the Italians, like the Indians, immigrated into their peninsula from the north," may be regarded as certain. There is ground for believing that the Latins were the first members of the Italian family to enter Italy, and that, having crossed the Apennines, they spread themselves to the s. along the western coast, driving the Iapygians before them, and finally cooping them up in the Calabrian peninsula—the heel of the boot. But this conquest belongs to prehistoric ages, and the original Latins of Campania, Lucania, Bruttium, perhaps even Sicily (i.e., the races spoken of in classic legend as the Itali, from whom the peninsula received its name, the Margetes, Ausones, Siculi, etc.), were themselves in the course of time so thoroughly Hellenized by the influence of the rich and powerful Greek colonies planted on their coasts (see MAGNA GRÆCIA), or so overwhelmed by the successive invasions of Samnite hordes, that nearly every trace of a primitive Latin nationality has disappeared, and only here and there a solitary linguistic or legendary relic survives to indicate faintly the path which conjecture should pursue. It was only in Latium proper, where no Greek colonies were founded, and where the fortune of war was in its favor, that the Latin branch of the Italian race firmly rooted itself. There, however, it did flourish, and petty as the district might seem—not more in all than 700 sq.m.—it was incomparably the most important in the peninsula, for within its limits rose those seven hills on which a city was to be built that was destined to subdue and govern the world. The other branch of the "Italian" stock, the Umbro-Sabellian, must have entered Italy at a later period than the Latin. Its advance along the central mountain-ridge—the Apennines—from n. to s. can still be traced; and its last phases—i.e., the conquest of Campania and the other southern districts of the peninsula by the Samnite highlanders—belong to purely historical times. The oldest members of this branch are probably the Sabines (q.v.), who seem to have fixed themselves in the mountainous region to the n.e. of Rome, and are regarded as the progenitors of that multitude of tribes which we find occupying the central portion of Italy—the Picentes, Peligni, Marsi, Æqui, Vestini, Marrucini, Frentani, Samnites—perhaps also the Volsci and Hernici.—4. *Gauls.*—To a period considerably later and comparatively historical, belong the settlement of the Gauls in the n., and of the Greeks in the s. of Italy. The former a branch of the Celtic race, itself now ascertained to be also a member of the great Aryan family (see CELTIC NATIONS), and therefore allied, however distantly, to the other Italian races, had, for ages before history begins, fixed themselves in the region now known as France. Finding further progress westward barred by the waves of the Atlantic, and being of a restless and excitable disposition, they turned their steps e. and s.e., broke over the Alps (according to the legend in Livy, by the little St. Bernard) some time during the 3d c. after the founding of Rome, and poured down into the plains of the Po. The first Gallic tribe that made its appearance on the soil of the peninsula is said to have been the Insubres, whose capital was Mediolanum (Milan); then followed the Cenomani, whose headquarters were Brixia (Brescia) and Verona, and afterward numerous kindred hordes, among the latest and most powerful of whom were the Boii (q.v.) and Senones, who forced their way across the Po, and effected a lodgment in the modern Romagna, occupying (besides an inland district) the coast of the Adriatic as far s. as Ancona. Hence, in ancient times, the whole of northern Italy was for a long period known as Gallia Cisalpina (Gaul on *this*, i.e., the Italian side of the Alps), to distinguish it from Gaul proper, which was called Gallia Transalpina. Gallia Cisalpina was again subdivided into two parts by the river Padus (Po); the northern being named Gallia Transpadana, and the southern (the country of the Boii and the Senones), Gallia Cispadana. Various other tribes or peoples are found in the n. of Italy, such as the Ligurians (along the gulf of Genoa), and the Veneti (in modern Venetia), regarding whose origin—in the absence of all linguistic and other memorials—we are utterly in the dark.—5. *Greeks.*—The other people which we have distinguished as "foreign" was the Greek. There is, however, this distinction to be observed, that the Greeks were not (like the Gauls) barbarians; they did not swoop down upon the southern shores of Italy (like the Norse pirates on the coasts of England and France) to plunder and devastate; nor did they force their way into the interior and dispossess the native inhabitants; they merely colonized the coasts, built cities, and carried on commerce. Through them it is probable the Romans acquired their earliest notions of the Greek literature, philosophy, and cultus. For further information concerning them, we refer the reader to the article MAGNA GRÆCIA, and to such of their cities as have received separate treatment.

***Primitive Social Condition of the Latins.*—With this brief introductory sketch of the various races that inhabited Italy in historical or prehistorical times, we may now**

revert to the Latins, with whom we have at present more particularly to do. What was the extent of their civilization, or how far their social organization had proceeded when they finally settled in the "broad plain" (*Lătium*, connected probably with *lātus*, broad; *lătus*, a side; Gr. *platus;* Eng. *flat*) that stretches westward from the Alban hills to the sea, may be conjectured, but cannot be positively ascertained. We know, indeed, that long before they had set foot in Italy, before even they had branched off from their Hellenic brethren, they had ceased to be *mere* nomads, or wandering shepherds. The evidence of this fact lies in their language. Not only do the names of the oldest Latin nations, as the *siculi* ("the sickle-bearers" or "reapers"), and the *osci*, or *opsci* ("field-laborers"), clearly prove the antiquity of Italian husbandry; but the oldest agricultural terms are actually common to both Latins and Greeks (e.g., Lat. *ager*, Gr. *agros;* Lat. *aro, aratrum*, Gr. *aroō arotron;* Lat. *ligo* (a hoe), Gr. *lachaino;* Lat. *hortus*, Gr. *chortos;* Lat. *milium*, Gr. *melinē;* Lat. *rapa*, Gr. *raphanis;* Lat. *malva*, Gr. *malachē;* Lat. *vinum*, Gr. *oinos*). Moreover, the form of the plow was the same among both peoples, as also their mode of cutting and preparing the grain; many of the usages of social life; the oldest methods of measuring the land; and the style of their national dress—the Latin *tunica*, corresponding exactly with the Greek *chiton*, while the Latin *toga* is only a fuller *himation*. Their method of building was also the same. Such evidence (and it could easily be extended, must be regarded as conclusively showing that before the Latino-Italians entered Italy, they had been accustomed to till the ground, to make wine, to keep gardens, to build houses, and to decently clothe themselves. As to their social organization, less can be said. It appears, however—judging from the general bearing of the most ancient traditions, as also from the features exhibited in historical times—that at a very early period, and from causes of which we are now absolutely ignorant, they had begun to develop the germs of what may be called "state-life." As among their Hellenic brethren, the original foundation of their social constitution was "households" (Gr. *oikiai*, Lat. *vici* or *pagi*, from *pangere*, to "fix" or "drive;" hence "to build"): these, either by ties of blood, or by nearness of locality, were aggregated into clans, and their dwellings formed clan-villages (thus *pagus*, which probably meant at first only a single "household," came, by a natural transition, to denote a collection of households—a hamlet, or a village). Such clan-villages were, however, not regarded as independent societies, but as parts of a political canton or community—the *civitas* or *populus*. Each canton or *civitas* possessed a local center or place of assembly, where justice was administered at regular intervals, where markets and sports were held, and religious rites celebrated, and which was besides fortified to serve as an asylum or place of refuge for the inhabitants of the open hamlets and their cattle in time of war. Such a center was termed the *capitolium*, i.e., "the height," from being originally fixed on a height or hill-top, and corresponded to the *akra* of the Greeks. Round this stronghold of the canton, which formed the nucleus or beginning of the earliest Latin towns, houses gradually sprung up, which in their turn were surrounded by the *oppidum* ("work," from *opus*), or the *urbs* ("ring-wall," connected with *urvus, curvus, orbis*); hence, in later times, *oppidum* and *urbs* became, naturally enough, the recognized designations of town and city. Evidence is not wanting to justify this view of the genesis of the Latin towns. In the ruder and more mountainous districts of central Italy, occupied by the Marsi, Æquicoli, etc., the system of living only in open villages prevailed down even to the close of the empire, and there the Roman antiquarians found, to their inexplicable surprise, those solitary strongholds with their mysterious ring-walls, which, on the soil of Latium proper, expanded into towns, but in the recesses of the Apennines never advanced beyond their original design.

The sites of the oldest of these cantonial centers or primitive towns in Latium are to be sought for on the slopes of the Alban hills, where the springs are freshest, the air most wholesome, and the position most secure. Tradition (which makes Alba Longa the oldest seat of a Latin community) is here in accordance with natural probability.* On the same slopes lay Lanuvium, Aricia, and Tusculum, to the great antiquity of which ancient tradition bears testimony in many ways: on the offshoots of the Sabine range, in the east of Latium, stood Tibur and Praeneste; in the plain between the Sabine and Alban ranges, Gabii, Labici, and Nomentum; on or near the coast, Laurentum and Lavinium; and on the isolated hills overlooking the Tiber (the boundary between Latium and Etruria), the frontier town of Rome. How many cantons were originally in Latium, it is neither possible nor important to know. Tradition mentions 30 sovereign or politically independent communities (with Alba Longa at their head), which formed the famous Latin league. The historical order of their constitution is a point regarding which we are equally ignorant, but there is reason to believe that the Roman canton, or at least its capital, the town of Rome, was among the latest political organizations of the Latins. The history and fortunes of this canton we now proceed briefly to trace.

History of Rome during the Earliest or Regal Period.—According to the myth of Romulus, Rome was an offshoot from Alba Longa, and to the biography of that hero we refer the reader for an outline of the ancient legend; but the most rational view of the city's origin is that which is suggested by a consideration of its site. It probably sprang into existence as a frontier defense against the Etruscans, and as an emporium for the river-traffic of the country; but whether it was founded by a common resolve of the Latin confederacy, or by the enterprise of an individual chief, is beyond the reach even of conjecture. The date fixed upon for the commencement of the city by the formation of the *Pomærium*, viz., April 21, 753 B.C., is, of course, perfectly valueless in its precision. We know and can know nothing whatever on the point. The three "tribes," Ramnians, Tities, and Luceres, who appear in the Romuleian legend as the constituent parts of the primitive commonwealth, suggest the idea that Rome (like Athens) arose out of a *synoikismos* or amalgamation of three separate cantons; but Mommsen rejects as "irrational" the common opinion that these cantons represent different races, and that the Romans were a "mongrel people," made up of Latins, Sabines, and Etruscans, with perhaps a dash of Hellenic and imaginary "Pelasgic" blood in their veins! The existence of a Sabine element, represented by the Tities, is indeed admitted; but its introduction is thrown back to a period long anterior to the foundation of the city, when the Roman clans were still living in their open villages, and nothing of Rome existed but its "stronghold" on the Palatine. Nor is there anything to indicate that it materially affected the Latin character, language, polity, or religion of the commonwealth which was subsequently formed.

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* It is perhaps hardly necessary to remark that the story of the foundation of *Alba Longa* by Ascanius, the son of Æneas, and the introduction of a Tyrrheno-Trojan element into the primitive history of Latium, is an utterly worthless fable.

The motives which probably led to the building of Rome also led to its rapid development, so that the great peculiarity of the Roman, as compared with the other Latin cantons, is the prominence which its urban life assumed in the earliest period. No doubt the Roman continued to manage his farm in the cantonal territory; but the insalubrity of the Campagna, as well as the advantages of river-traffic, and the necessity for watchfulness imposed upon all frontier towns in rude ages, must ever have acted as an inducement to him to take up his residence as much as possible in the city. The consequence was that the Roman became essentially a "citizen," while the other Latins remained essentially "rustics." So markedly is this the case, that the beginnings of Roman history—if the ancient legend may be so designated—are mainly records of its urban expansion and political growth. That the Palatine hill was the oldest portion of the city is attested by a variety of circumstances. Not only does it hold that rank in the Romuleian legend, but on it were situated the oldest civil and religious institutions. The Romuleian myth of the establishment of an asylum on the Capitoline (see CAPITOL) for homicides and runaway slaves, with all its famous consequences—the *Rape of the Sabine Women*, the wars with the Latins of Cænina, Antemnæ, and Crustumerium, but especially with the Sabines of Cures under their king Titus Tatius, the tragic fate of Tarpeia, and the fine feminine valor of the ravished maidens, who had learned to love their captors, is historically worthless; except, perhaps, so far as it shows us how from the beginning the Roman burghers were engaged in constant feuds with their neighbors for the aggrandizement of their power. The entire history of the "regal period," in fact, has come down to us in so mythical and legendary a form, that we cannot feel absolutely certain of the reality of a single incident. That such personages as Numa Pompilius, Tullus Hostilius, Ancus Martius, Lucius Tarquinius Priscus, Servius Tullius, and Lucius Tarquinius Superbus, ever existed, or, if they did, that the circumstances of their lives, their institutions, their conquests, their reforms, were as the ancient narrative describes them, are things which no critical scholar can believe. The destruction of the city records by the Gauls, when they captured and burned Rome in the 4th c. B.C., deprived the subsequent chroniclers of authentic information in regard to the past, and forced them to rely upon treacherous reminiscences, on oral tradition, on ballads, and on all the multifarious fabrications of a patriotic fancy, that would naturally seek compensation for political disaster in the splendor with which it would invest its primeval history. The utmost reach, therefore, to which our knowledge can attain, is to form some general idea—mainly by inference from the institutions that we find existing in later times—of the course that social and political progress followed in the Roman commonwealth.

From the very beginning of the city—and probably long before—the inhabitants were divided into two orders (exclusive of "slaves")—viz., householders and their dependents, better known perhaps as "patricians" (from *pater*, a father) and "clients" (i.e., "listeners," from *cluere*, "to listen"). The former alone possessed political—i.e., burgess-rights. It was they who exclusively constituted the *populus* ("the people"); while the clients had no political existence whatever. How this latter class originated we do not know, but "superiors" and "inferiors" exist everywhere, and there is really nothing wonderful in the phenomena, except the rigor of their political subjection. In a thriving community like the Roman, which seems to have always held a somewhat isolated and antagonistic position to the other Latin cantons, new-comers, such as refugees and the like, would be frequent; and these alien settlers, it is clear, never obtained (except under very special circumstances) the privileges of the original Roman families. That the clients formed a body essentially different from the *plebs* is not true, and seems based merely on the mythical account of what followed the destruction of Alba Longa by Tullus Hostilius. The name plebs (i.e., "the multitude," from the same root as *pleo*, I fill, *plenus*, full; with which is perhaps connected the other Latin word *vulgus*, Eng. *folk*), is doubtless, as its signification indicates, of later origin than *clientes*, but both are applicable to the same persons, who were called "listeners," in reference to their being dependents on the different burgess-households, and the "multitude," in reference to their want of political rights. The constitution of the state was simple. All the burgesses were politically on a footing of equality. From their own ranks was chosen the king or "leader" (*rex*), who was therefore nothing more than an ordinary burgess—a husbandman, a trader, a warrior, set over his fellows. But it must at the same time be observed that his authority was great, for the Roman state was based on the Roman household, and something of the absoluteness of the *patria potestas* appears in the uncircumscribed nature of the regal powers. The *rex* held his office for life; he consulted the national gods; he appointed the priests and priestesses; he called out the *populus* for war, and led the army in person; his command (*imperium*) was not to be gainsaid, on which account on all official occasions he was preceded by "messengers" or "summoners" (*lictores*, from *licere*, "to summon," though commonly given from *ligo*, "to bind"), bearing the "fasces" (axes and rods tied up together), the symbols of power and punishment; he had the keys of the public chest, and he was supreme judge in all civil and criminal suits. The Roman religion or *cultus* was from the first thoroughly subordinate to the authority of the state; and all that we can infer from the myth of Numa is that Rome perhaps owed its colleges of augurs and pontiff to the wisdom of some enlightened sovereign who felt himself at times embarrassed in his decisions on matters of religious and public law, and recognized how valuable might be the aid afforded him by a body of sacred experts. We may rest certain that originally the sole power was the regal, and that the subordinate magistracies found at a later time arose from a delegation of regal authority, rendered necessary by the ceaseless increase of state-business. "All the officials of the earliest period," says Mommsen (who has expounded this view with admirable sagacity in his chapter on the "Original Constitution of Rome"), "the extraordinary city-warden (*præfectus urbi*, who doubtless governed in the absence of the *rex*), as well as those who were probably nominated regularly, the 'trackers of foul murder' (*quæstores parricidii*), and the 'leaders of division' (*tribuni*, from *tribus*, part) of the infantry (*milites*), and of the cavalry (*celeres*), were mere royal commissioners, and not magistrates in the subsequent sense of the term." On the other hand, we may believe that the *senatus*, or council of the elders, from its very nature, was as old an institution as the monarchy itself. Among the very first things the "citizen-king" would do, would be to choose out of the ranks of his fellow-burgesses a number of experienced men to assist him with their counsel; but it is to be observed that this body possessed no coercive or constraining powers. They gave their advice when the *rex* chose to ask it; that was all. Yet, as the tenure of their office was for life, they necessarily possessed great *moral* authority; and it was only when the king, the senate, and the community were at one in regard to any important matter—a war, for example—that it was held to be righteous, and likely to be favored by the gods. The burgesses, or householders, were divided into *curiæ*—i.e., "wardships," connected probably with *cura* and *curare*, "to care for," rather than with *quiris*, and the Sabine *cures*, as Varro thinks. Ten households formed a *gens* (a "clan" or "family"); 10 clans, or 100 households, formed a *curia*, or wardship; and 10 wardships, or 100 clans, or 1000 households, formed the *populus*, *civitas*, or community. But as Rome was a *synoikismos* of three cantons, the actual number of wards was 30, of clans 300, and of households 3,000. Every household had to furnish one foot-soldier (hence the name *mil-es*, the "thousandth walker," from *mil*, and *eo* (?) "to go"), and every clan a horseman and a senator. Each ward was under the "care" of a special warden (the *curio*), had a priest of its own (the *flamen curialis*), and celebrated its own festivals. None but burgesses could bear arms in defense of the state (hence their designation, *populus*, "the warrior body," connected with *populari*, "to lay waste," and *popa*, "the priest, or priest's assistant, who felled the victim at the altar—the sacred butcher"). In the old litanies the blessing of Mars is invoked upon the *pilumnus poplus* ("the spear-armed warrior-body"), and when the *rex* addressed them it was by the name of *quirites* ("lancemen," from *quiris*, or *curis*, a "lance," and *eo*, "to go"). The original Roman army, or *legio* (i.e., "the gathering"), was composed of three "hundreds" (*centuriæ*) of horsemen (*celeres*—i.e., "the swift," or *flexuntes*, "the wheelers"), under their divisional leaders (*tribuni celerum*); and three "thousands" of footmen (*milites*), also under divisional leaders (*tribuni militum*), to whom are added a number of light-armed skirmishers (*velites*), especially "archers" (*arquites*). The *rex*, as we have said, was usually the gen., but as the cavalry force had a col. of its own (*magister equitum*), it is probable that he placed himself at the head of the infantry. Military service was no doubt the prime duty of the Roman burgesses, but the king could impose upon them any labors that he reckoned necessary or advantageous to the welfare of the state, such as the erection of public edifices, the tilling of the royal demesnes, the execution of royal commissions, or the building of the city walls.

The "foreign policy" of Rome seems to have been aggressive from the first, and this character it retained as long as the aggrandizement of the state was possible. We have, it is true, no certain knowledge of the primitive struggles in which the enterprising and ambitious Roman burghers were engaged, but it appears from the legend that at a very early period the neighboring Latin communities of Antemnæ, Crustumerium, Ficulnea, Medullia, Cænina, Corniculum, Cameria, Collatia, were subjugated. The crisis of the Latin war, however, was undoubtedly the contest with Alba Longa, in which that "sacred metropolis" of Latium was destroyed, and its leadership passed to the conqueror. How deadly the struggle between the two was, may be inferred from the tragic details in which the legend abounds. As a rule, on the subjugation of a canton, the conquered inhabitants were allowed to remain in their open hamlets, but their *capitolium* was razed, their weekly market, their justice-court, their gods—everything, in short, strictly national—were removed to Rome, while they themselves were enrolled among the clients or plebs. But sometimes the inhabitants themselves, in whole or part, were transferred to Rome, and individuals or clans were even received into the ranks of the Roman burgesses, as in the case of Alba Longa. Some of the famous Roman *gentes* claimed to be of Alban descent —the Julii, Servilii, Quinctilii, Cloelii, Geganii, Curiatii, and Metilii. The wars with the Etruscans of Fidenæ and Veii—assigned, like the destruction of Alba Longa, to the reign of Tullus Hostilius—were apparently indecisive; those with the Rutuli and Volsci, however, were probably more fortunate; but uncertainty hangs like a thick mist over the ancient narrative. Even the story of the Tarquins, though it belongs to the later period of the monarchy, is in many of its details far from credible. Both Niebuhr and Mommsen consider "Tarquin the proud" a historical personage, and without accepting literally all the circumstances of the tradition, believe the general outline—his character, his exactions, his expulsion, and his desperate efforts for the recovery of the throne—to be trustworthy. The memory of such a monarch was likely to be preserved by the very strength of the hatred he excited, and an act so daring as his expulsion (which was at the same time the death-knell of a system of government that had prevailed for ages) could hardly be a mere invention, though it might be overlapped with fold upon fold of picturesque fiction. The view taken by Napoleon III. (see *Histoire de Jules César*, vol. i.), that the primitive monarchy had served its purpose, and had consequently to disapapear, is perhaps not so erroneous as the oracular language of the imperial author would lead us to suppose. The aristocracy or *populus* had become so much more powerful than the individual *rex*, that they wished to possess *de jure* as well as *de facto* the supreme authority. The pride and tyranny of a Tarquin may very well have aided in furthering their designs.

Meanwhile a great internal change had taken place in Rome. This is usually designated the Servian "reform of the constitution," although the expression is calculated to mislead. There was nothing directly political in the "reform." It was only a reform in the burgess-levy—i.e., in the mode of raising the army. Formerly, as we have seen, none but burgesses could bear arms in defense of the state; but the increase of the general population, caused partly by the annexation of the conquered Latin communities, and partly by time, had totally altered the relation in which the non-burgesses, or *plebs*, originally stood to their political superiors. The *plebs* could, of course, acquire property and wealth, and could bequeath it just as legally as the *populus;* moreover, such of the Latin settlers as were wealthy and distinguished in their own communities, did not cease to be so when they were amalgamated with the Roman "multitude." It was therefore felt to be no longer judicious to let the military burdens fall exclusively upon the old burgesses, while the rights of property were equally shared by the non-burgesses. Hence the new arrangement, known in Roman history as the formation of the *comitia centuriata*. When or with whom the change originated it is impossible to say. The legend assigns it to Servius Tullius, predecessor of Tarquin the proud; and it was in all probability the work of some kingly ruler who saw the necessity of reorganizing the national forces. That it cannot be regarded as a change brought about by party zeal, is obvious when we reflect that it conferred no rights, but only imposed duties on the plebeians. Its details were briefly as follows: Every Roman freeholder from the age of 17 to 60, whether patrician or plebeian, was made liable to serve in the army; but he took his place according to the amount of his property. The freeholders were distributed into five *classes* (i.e., "summonings," from *calare*, to "summon" or "call out"), and these *classes*, all of whom were infantry, were again subdivided into *centuriæ* ("hundreds"). The *first* class, which required to possess property valued at 100,000 ases, or an entire hide of land, furnished 82 "hundreds;" the second, property valued at 75,000 ases, or ¾ of a hide of land, furnished 20 "hundreds;" the third, property valued at 50,000 ases, or ½ hide of land, furnished 20 "hundreds;" the fourth, property valued at 25,000 ases, or ¼ hide of land, furnished 20 "hundreds;" and the fifth, property valued at 12,500 ases, or ⅛ hide of land, furnished 82 "hundreds." A single "hundred" was, moreover, added from the ranks of the non-freeholders, or *proletarii* (mere children-begetters"), although it is possible that from the same order came the two "hundreds" of "horn-blowers" (*cornicines*), and "trumpeters" (*tibicines*), attached to the fifth class. Thus the infantry "hundreds" amounted to 175, that is 17,500 men, besides whom were 18 "hundreds" of *equites* ("horsemen") chosen from the wealthiest burgesses and non-burgesses; so that the Roman army now numbered in all nearly 20,000 men. We have stated that the original design of this new arrangement was merely military, but it is easy to see that it would soon produce political results. Duties and rights are correlative. The former suggest the latter, and create a desire for their attainment. Hence the Servian military reform paved the way for the grand political struggle between the patricians and the plebeians, which commenced with the first year of the republic, and only terminated with its dissolution.

The Roman Republic from its Institution to the Abolition of the Decemvirate.*—1. *Internal

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History.—According to the legend, the expulsion of the Tarquins was mainly the work of their cousins, Junius Brutus and Tarquinius Collatinus, in revenge for the outrage on the honor of Lucretia, and was followed by the abolition of the monarchy. The date usually assigned to this event is 509 B.C. The story is intensely tragical, and if we must consider it poetry rather than fact, yet it may safely be taken as evidence that it was an unbridled lust of power and self-gratification that brought ruin on the Romano-Tuscan dynasty. Of course, we can make nothing definite out of the early years of the republic. Dates and names, and even events, must go for very little. Valerius Publicola or Poplicola, Sp. Lucretius, M. Horatius, Lars Porsenna (q.v.) of Clusium, Aulus Postumius, with the glorious stories of Horatius Cocles and the battle of lake Regillus, will not bear to be scrutinized, We must content ourselves with the knowledge of historical tendencies and general results. The change from "kings" to "consuls" (*consules*, "those who leap together"—more generally, those who *act* together) was not intended to diminish the administrative power of the supreme rulers, but only to deprive them of the opportunity of doing harm—of becoming Tarquins; and this it effectually succeeded in doing, by limiting their tenure of office to a year, and by numerous other restrictions. (For an account of their original functions, and of the subsequent modifications which these underwent, see CONSUL.) It is believed to have been about this time, and in consequence of the new political changes, that the old assessors of the king, such as the *quæstores parricidii*, formally became standing magistrates instead of mere honorary counselors, and also that the priesthood became a more self-governing and exclusive body. During the regal period the priests were appointed by the king, but now the colleges of augurs and pontiffs began to fill up the vacancies in their ranks themselves, while the vestals and separate "flamens" were nominated by the pontifical college, which chose a president (*pontifex maximus*) for the purpose. The lapse of years ever increasing the quantity of sacred lore, also increased its importance, and the importance of those who specially studied it; and nothing comes out more clearly in the early history of the republic than the fact that the opinions of the augurs and pontiffs became more and more legally binding. This is to be connected with the fact that in every possible way the patricians or old burgesses—now rapidly becoming a mere *noblesse*—were seeking to rise on the ruins of the monarchy, and to preserve separate institutions for the benefit of their own order, when they could with difficulty longer exclude the *plebs* from participation in common civic privileges. In the details given us of the "Servian reform," we can easily discern a spirit of compromise, the concessions made to the plebeians in the constitution and powers of the *comitia centuriata* being partially counterbalanced by the new powers conferred on the old burgess body, the *comitia curiata*—viz., the right of confirming or rejecting the measures passed in the lower assembly. Toward the new assembly, therefore, it stood somewhat in the relation in which the house of lords stands to the house of commons, but the analogy must not be pushed too far; it is only general. The character of the senate altered under the action of the same influences. Although it never had been formally a patrician body—although admission to it under the kings was obtainable simply by the exercise of the royal prerogative, yet, practically, 299 out of the 300 senators had always been patricians; but after the institution of the republic, we are told that the blanks in the senate were filled up *en masse* from the ranks of the plebeians, so that of the 300 members less than half were *patres* ("full burgesses"), while 164 were *conscripti* ("added to the roll"), hence the official designation of the senators *patres et conscripti* ("full burgesses and enrolled").

As yet, however, it is to be observed the plebeians were rigorously excluded from the magistracies. They could vote—i.e., they could exercise legislative powers—but they had no share in the administration. None but patricians were eligible for the consulship, for the office of quæstor, or for any other executive function, while the priestly colleges rigidly closed their doors against the new burgesses. The struggle, therefore, between the two orders went on with ever-increasing violence. One point comes out very clearly from the narrative, however dubious we may be of the particular details, viz., that the establishment of the republic and the reconstitution of the burgess body, instead of allaying discontent, only fostered it. Power virtually passed into the hands of the capitalists, and though some of these were plebeians, yet they would seem to have preferred their personal money-interests to the interests of their order, and to have co-operated with the patricians. The abuse by these capitalists of the *ager publicus*—that is, such portion of the land of a conquered people as had been taken from them, annexed to the Roman state, and let out originally to the patricians at a fixed rent (see AGRARIAN LAW), together with the frightful severity of the law of debtor and creditor, the effect of which was all but to ruin the small plebeian "farmers," who constituted, perhaps, the most numerous section of the burgesses—finally led to a great revolt of the plebs, known as the "secession to the sacred hill," the date assigned to which is 494 B.C. On that occasion the plebeian farmer-soldiers, who had just returned from a campaign against the Volscians, marched in military order out of Rome, under their plebeian officers, to a mount near the confluence of the Anio with the Tiber, and threatened to found there a new city, if the patricians did not grant them magistrates from their own order; the result was, the institution of the famous plebeian tribunate (see TRIBUNE)—a sort of rival power to the patrician *consulate*, by means of which the plebeians, at least, hoped to be shielded from the high-handed oppressions of the wealthy. To the same period belongs the ædiles (q.v.). A little later, the *comitia tributa* emerged into political prominence. This was really the same body of burgesses as formed the *comitia centuriata*, but with the important difference that the number of votes was not in proportion to a property classification. The poor plebeian was on a footing of equality with the rich patrician; each gave his vote, and nothing more. Hence the *comitia tributa* virtually became a plebeian assembly, and when the *plebiscita* ("resolutions of the plebs carried at these *comitia*) acquired (as they did by the Valerian laws passed after the abolition of the decemvirate) a legally binding character, the victory of the "multitude" in the sphere of legislation was complete. From this time the term *populus* practically, though not formally, loses its exclusive significance; and when we speak of the Roman citizens, we mean indifferently patricians and plebeians. The semi-historical traditions of this period—for we are now (5th c. B C.) beginning to emerge out of the mythical era —unmistakably show that the institution of the tribunate led to something very like a civil war between the two orders. Such is the real significance of the legends of Caius Marcus, surnamed *Coriolanus* (q.v.); the surprise of the capitol by the Sabine marauder, Appius Herdonius, at the head of a motley force of political outlaws, refugees, and slaves; the migrations of numerous Roman burgesses with their families to more peaceful communities; the street-fights; the assassinations of plebeian magistrates; the annihilation by the Etruscans of the Fabian *gens*, who had left Rome to escape the vengeance of their order for having passed over to the side of the plebeians; and the atrocious judicial murder of Spurius Cassius, an eminent patrician, who had also incurred the deadly hatred of his order, by proposing an agrarian law that would have checked the pernicious prosperity of the capitalists and overgrown landholders. Finally, 462 B.C., a measure was brought forward by the tribune C. Terentillius Ursa, to appoint a commission of ten men to draw up a code of laws for the purpose of protecting the plebeians against the arbitrary decisions of the patrician magistrates. A fierce, even a frantic opposition was offered by the patricians, and the ten years that followed were literally a period of organized anarchy in Rome. At length the nobles gave way, and the result was the drawing up of the famous code known as the *Twelve Tables*—at first *Ten*, to which two were afterward added—the appointment of the decemviri (q.v.), and the abolition of all the ordinary magistrates, both patrician and plebeian. The government by decemvirs, however, lasted only two years; according to tradition, the occasion of its overthrow was the attempt of the principal decemvir, Appius Claudius (q.v.) to possess himself by violence of the beautiful daughter of Virginius, a Roman centurion; but the real cause was doubtless political, though the cruel lust of a Claudius may have afforded the occasion; the result of which was the restoration of the predecemviral state of things—the patrician consulate and the plebeian tribunate.

2. *External History.*—The external history of Rome, from the establishment of the republic to the abolition of the decemvirate, is, it need hardly be said, purely military. The Romans fought incessantly with their neighbors. Long before the close of the regal period they had acquired, as we have seen, the leadership of Latium, and in all the early wars of the republic they were assisted by their allies and kinsmen; sometimes also by other nations—as, for example, the Hernicans, between whom and the Romans and Latins a league was formed by Spurius Cassius in the beginning of the 5th c. B.C. The most important of these wars were those with the southern Etruscans, especially the Veientines, in which, however, the Romans made no way, and even suffered terrible disasters, of which the legend concerning the destruction of the Fabian *gens* on the Cremera (477 B.C.) may be taken as a distorted representation; the contemporaneous wars with the Volscians, in which Coriolanus is the most distinguished figure; and those with the Æqui (458 B.C.), to which belongs the fine legend of Cincinnatus (q.v.).

From the Abolition of the Decemvirate to the Defeat of the Samnites, and the Subjugation of all the "Italians" (449–265).—1. *Internal History.*—The leading political features of this period are the equalization of the two orders, and the growth of the new aristocracy of capitalists. After the abolition of the decemvirate, it would seem—judging from the course of events—that the whole of the plebeian aristocracy, senators and capitalists (from motives of selfish aggrandizement) combined with the "masses" of their order to make a series of grand attacks on the privileges of the old Roman *noblesse*. The struggle lasted for 100 years; and ended, as it could only end, by the removal of all the social and political disabilities under which the plebeians had labored—though the stratagems and artifices to which the old aristocracy had recourse proved the reluctance with which they succumbed to fate. First in 445 B.C., only four years after the fall of the decemvirs was carried, the *lex Canuleia*, by which it was enacted that marriage between a patrician and plebeian should be legally valid. At the same time, a compromise was effected with respect to the consulship. Instead of two patrician consuls, it was agreed that the supreme power should be intrusted to new officers termed "military tribunes with consular power," who might be chosen equally from the patricians or plebeians. Ten years later (435 B.C.) the patricians tried to render the new office of less consequence by the transference of several of the functions hitherto exercised by consuls to two special patrician officers named *censors* (q.v.). The "censorship," Mommsen remarks, "gradually became the palladium of the aristocratic party, less on account of its financial influence, than for the sake of the right annexed to it of filling up vacancies in the senate and in the equites." In 421 B.C., the quæstorship (see QUÆSTOR) was thrown open to the plebeians; in 368 B.C., the mastership of the horse; in 356 B.C., the dictatorship (see DICTATOR); in 351 B.C., the censorship; in 337 B.C., the prætorship (see PRÆTOR); and in 300 B.C., the pontifical and augurial colleges. These victories were not all won without the shedding of blood. How great was the exasperation of the patricians may be estimated from the story of Spurius Maelius, the rich plebeian, who was murdered simply because in a season of famine he sold corn at a very low price to the poor.

The only effect, it is to observed, of these political changes was to increase the power of the rich plebeians; and consequently, the social distress continued to show itself as before. No genuine national concord was possible so long as *that* remained unmitigated. Efforts were repeatedly made by individuals to remedy the evil, but without success. Such were the attempts of the tribunes Spurius Maecilius and Spurius Metilius (417 B.C.) to revive the agrarian law of Spurius Cassius; and of the noble and patriotic patrician, Marcus Manlius, who, though he had saved the capitol during the terrible Gallic siege, was hurled from the Tarpeian Rock (384 B.C.), on the customary charge, as groundless in his case as it was base, of aspiring to the monarchy; but at length (367 B.C.), after a furious struggle of eleven years, the famous Licinian rogations (see AGRARIAN LAW) were carried, by means of which it was hoped that an end had been put to the disastrous dissensions of the orders. Thus, at least, we interpret the act of the dictator Camillus, who raised a temple to the goddess *Concord*, at the foot of the capitol.

That these laws operated beneficially on the class in whose interest they were passed, viz., the plebeian-farmers or middle-class of the Roman state, is unquestionable; but events proved that they were inadequate to remedy the evil, and after a time they ceased to be strictly enforced. On the other hand, there can be as little doubt that, owing partly to these changes, and still more to the splendid and far-reaching conquests achieved in Italy during this period of internal strife by the Roman arms, the position of the plebeian farmer was decidedly raised.. Not only were the "general coffers filled" by the revenue drawn directly or indirectly from the subjugated lands, so that a *tributum* (a forced loan) seldom required to be enforced at home, but the numerous colonies which Rome now began to send forth to secure her new acquisitions, consisted entirely of the poorer plebeians, who always received a portion of the land in the district where they were settled. The long struggle between the two orders was thus virtually at an end; but the date usually assigned to the termination of the strife is 286 B.C., when the *lex Hortensia* was passed which confirmed the Publilian laws of 339 B.C., and definitely gave to the *plebiscita* passed at the comitia of the tribes, the full power of laws binding on the whole nation. Gradually, however, by steps which we have not room to trace, the importance of the popular assemblies declined, and that of the senate rose. This was owing mainly to the ever-increasing magnitude of the Roman state, and to the consequent necessity of a powerful governing body. The senate, it will be remembered, originally possessed no administrative power at all, but now it commenced a series of vast usurpations of which the best defense is that they excited no opposition among the community. Every matter of general importance—war, peace, alliances, the founding of colonies, the assignation of lands, building, the whole system of finance—came under its supervision and authority. Nor, on the whole, did it prove itself the unworthy arbiter of a nation's destinies. It was not a self-elected oligarchy, but was rather composed of the ablest representatives of both orders.

2. *External History.*—We have said that the military successes of Rome during this period of internal strife were great; but we can only briefly allude to them. The irruption of the Gauls into sub-Apennine Italy (391 B.C.), though accompanied by frightful devastations, was barren of results, and did not materially affect the progress of Roman conquest. No doubt the battle on the Allia, and the capture and burning of Rome (390 B.C.), were great disasters, but the injury was temporary. The vigilance of Manlius saved the capitol, and the heroism of Camillus revived the courage and spirit of the citizens. Again and again in the course of the 4th c. B.C., the Gallic hordes repeated their incursions into central Italy, but never again returned victorious. In 367 B.C. Camillus defeated them at Alba; in 360 B.C. they were routed at the Colline gate; in 358 B.C. by the dictator, G. Sulpicius Peticus; and in 350 B.C. by Lucius Furius Camillus. Meanwhile, aided by their allies, the Latins and the Hernicans, the Romans carried on the long and desperate struggle with the Æquians, Volscians, and Etruscans. Finally, but not till after they had sustained repeated defeats, the Romans triumphed. The causes that led to the decline of the Etruscan power, which, at the close of the regal period in Rome, and during the infancy of the republic, had been enormous, both by sea and land, cannot be considered at length here. Suffice it to say that the terrible irruption of the Gallic barbarians into Etruria, and the victories of the Samnites in Campania, where also the Etruscans had established themselves, as well as the miserable jealousies of the different cities, combined to paralyze the power of this people, and paved the way for the final triumph of Rome. But even before the Gauls had crossed the Apennines, the fate of Etruria was virtually sealed. The fall of Veii (q.v.), 396 B.C., was really the death knell of Etruscan independence. Although the story has undoubtedly descended to us in a mythical dress, the siege of Veii is by no means to be placed in the same category with the siege of Troy, albeit, like it, it is said to have lasted ten years. Falerii, Capena, and Volsinii—all sovereign cities of Etruria—hastened soon after to make peace, and by the middle of the 4th c. B.C., the whole of southern Etruria

had submitted to the supremacy of Rome, was kept in check by Roman garrisons, and denationalized by the influx of Roman colonists. In the land of the Volsci, likewise, a series of Roman fortresses were erected to overawe the native inhabitants; Velitrae, on the borders of Latium, as far back as 492 B.C., Suessa Pometia (442 B.C.), Circeii (393 B.C.), Satricum (885 B.C.), and Setia (382 B.C.); besides the whole Volscian district, known as the Pontine Marshes (q.v.), was distributed into farm allotments among the plebeian soldiery. Becoming alarmed, however, at the increasing power of Rome, the Latins and Hernicans withdrew from the league, and a severe and protracted struggle took place between them and their former ally. Nearly 80 years elapsed before the Romans succeeded in crushing the malcontents and restoring the league of Spurius Cassius. In the course of this war the old Latin confederacy of the "thirty cities" was broken up (384 B.C.), probably as being dangerous to the hegemony (now rapidly becoming a supremacy) of Rome, and their constitutions were more and more assimilated to the Roman. The terms of the treaty made by the Romans (348 B.C.) with the Carthaginians show how very dependent was the position of the Latin cities. Meanwhile, the Romans had pushed their garrisons as far south as the Liris, the northern boundary of Campania. Here they came into contact with the Samnites (q.v.), a people as heroic as themselves, their equals in everything but unity of political organization; perhaps their superiors in magnanimity.

The Samnites had long been extending their conquests in the south of Italy, just as Rome had in the center and in Etruria. Descending from their native mountains between the plains of Apulia and Campania, they had overrun the lower part of the peninsula, and under the name of Lucanians, Bruttians, etc., had firmly established themselves, threatening everywhere the prosperity of the Greek and Etruscan possessions in those regions. But it was the dwellers in the original mountain territory who properly bore the name of Samnites, and between them and the Romans now commenced a tremendous struggle; the former fighting heroically for the preservation of their national freedom—the latter warring with superb valor for dominion. We cannot afford space to recount the circumstances that brought about the collision, further than to state that the Samnite colonies had in the course of time become so detached in sympathy, and so changed in character and interests from the parent stock, as almost to forget their original unity. Hence, hostilities were common between them; and the forays of the Samnite highlanders in the rich lowlands of Campania were dreaded above all things by their more polished, but degenerate, kinsmen of Capua, who had acquired the luxurious habits of the Greeks and Etruscans. It was really to save themselves from these destructive forays that the Campanians offered to place themselves under the supremacy of Rome; and thus Romans and Samnites were thrown into a position of direct antagonism. The Samnite wars, of which three are reckoned, extended over 58 years (343–290 B.C.). The second, generally known as the "great Samnite war," lasted 22 years (826–804 B.C.). At first the success was mainly on the side of the Samnites; and after the disaster at the *Caudine Forks* (q.v.), it seemed as if Samnium, and not Rome, was destined to become the ruler of Italy; but the military genius of the Roman consul, Quintus Fabius Rullianus (see FABIUS), triumphed over every danger, and rendered all the heroism of Caius Pontius, the Samnite leader, unavailing. In 304 B.C. Bovianum, the capital of Samnium, was stormed, and the hardy highlanders were compelled to acknowledge the supremacy of the republic. The third war (298–290 B.C.) was conducted with all the sanguinary energy of despair; but though the Etruscans and Umbrians now joined the Samnites against the Romans, their help came too late. The victory of Rullianus and of P. Decius Mus, at Sentinum (295 B.C.), virtually ended the struggle, and placed the whole of the Italian peninsula at the mercy of the victor. It only remains to be mentioned here that at the close of the first Samnite war, which was quite indecisive, an insurrection burst out among the Latins and Volscians, and spread over the whole territory of these two nations; but the defeat inflicted on the insurgents at Trifanum (340 B.C.) by the Roman consul, Titus Manlius Imperiosus Torquatus, almost instantly crushed it, and in two years the last spark of rebellion was extinguished. The famous Latin league was now dissolved; many of the towns lost their independence and became Roman *municipia;* new colonies were planted both on the coast and in the interior of the Latino-Volscian region: and finally so numerous were the farm allotments to Roman burgesses that two additional tribes had to be constituted.

From the Close of the Samnite to the Commencement of the Punic Wars.—The war with Pyrrhus (q.v.), king of Epirus, which led to the complete subjugation of peninsular Italy, is a sort of pendant to the great Samnite struggle. It was brought about in this way: The Lucanians and Bruttians, who had aided the Romans in the Samnite wars, considering themselves cheated of their portion of the spoil, entered into negotiations with the enemies of their former associate throughout the peninsula. A mighty coalition was immediately formed against Rome, consisting of Etruscans, Umbrians, and Gauls in the n., and of Lucanians, Bruttians, and Samnites in the s., with a sort of tacit understanding on the part of the Tarentines that they would render assistance by and by. The rapidity with which it took shape shows alike the fear and the hatred inspired by the Roman name. In the course of a single year the whole n. was in arms, and once more the power, and even the existence of Rome, were in deadly peril. An entire Roman army of 13,000 men was annihilated at Arretium (284 B.C.) by the Senonian Gauls, but that dauntless spirit which the republic never failed to display in the crisis of its fortunes, and which gave a sublime dignity to its worst ambition, now shone out in the fullness of its splendor. Publius Cornelius Dollabella marched into the country of the Senones at the head of a large force, and literally extirpated the whole nation, which henceforth disappears from history. Shortly afterward the bloody overthrow of the Etrusco-Boian horde at lake Vadimo (283 B.C.), shattered to pieces the northern confederacy, and left the Romans free to deal with their adversaries in the south. The Lucanians were quickly overpowered (282 B.C.); Samnium, broken by its long and luckless struggle, and overawed by the proximity of a Roman army, could do nothing. A rash and unprovoked attack on a small Roman fleet now brought down on the Tarentines the vengeance of Rome, at the very moment Rome was free to exert all her terrible power. Awaking to a sense of their danger the Tarentines invited Pyrrhus (q.v.) over from Epirus, and appointed him commander of their mercenaries. This royal adventurer, a man of the most brilliant, but also of the most volatile genius, resembling no modern general so much as Charles Mordaunt, earl of Peterborough, arrived in Italy (280 B.C.) with a small army of his own, and a vague notion in his head of founding a Hellenic empire in the w., that should rival that created in the e. by his kinsman, Alexander the great. It is not necessary to narrate here the varying fortunes of the struggle between Pyrrhus and the Romans, which lasted only six years, and ended in his being obliged to return to Epirus without accomplishing anything.

After Pyrrhus, baffled in his attempts to check the progress of Rome, had withdrawn to Greece, the Lucanians and Samnites, whom his reputation and original successes had induced to rise once more against the dreaded foe, continued the unequal struggle, but "even the bravery of despair," as it has been said, "comes to an end; the sword and the gibbet at length (269 B.C.) carried peace even into the mountains of Samnium." Tarentum had surrendered three years earlier; and now from the Macra and the Rubicon to the straits of Messina there was not a nation in Italy that did not acknowledge the supremacy of Rome. Distant kingdoms began to feel that a new power had risen in the world; and when Ptolemy Philadelphus, sovereign of Egypt, heard of the overthrow of the famous Epirote warrior, he sent an embassy to Rome (273 B.C.), and concluded a treaty with the republic. To secure their new acquisitions, the Romans established in the s. military colonies at Pæstum and Cosa, in Lucania (273 B.C); at Beneventum (268 B.C.), and at Æsernia (263 B.C.), to overawe the Samnites; and in the n., as outposts against the Gauls, Ariminum (268 B.C.). Firmum in Picenum (264 B.C.), and the burgess colony of Castrum Novum. Preparations were also made to carry the great Appian highway as far as Brundisium, on the Adriatic, and for the colonization of the latter city as a rival emporium to Tarentum.

The political changes were almost as important as the military. The whole population of peninsular Italy was divided into three classes—1. *Cives Romani*, or such as enjoyed the full burgess privileges of Roman citizens; 2. *Nomen Latinum*—that is, such as possessed the same privileges as had been enjoyed by the members of the quondam Latin league—viz., an equality with the Roman burgesses in matters of trade and inheritance, the privilege of self-government, but no participation in the Roman franchise, and consequently no power to modify the foreign policy of the state; 3. *Socii*, or "allies," to some of whom were conceded most liberal privileges, while others were governed in an almost despotic fashion. The *Cives Romani* no longer embraced merely the inhabitants of the old Roman community, the well-known "tribes") of whom there are now 33), but all the old burgess-colonies planted in Etruria and Campania, besides such Sabine, Volscian, and other communities as had been received into the burgess body on account of their proved fidelity in times of trial, together with individual Roman emigrants or families of such, scattered among the *municipia*, or living in villages by themselves. The cities possessing the *Latinum Nomen* included most of the "colonies" sent out by Rome in later times, not only in Italy, but even beyond it; the members of which, if they had previously possessed the Roman franchise, voluntarily surrendered it in lieu of an allotment of land. But any "Latin" burgess who had held a magistracy in his native town, might return to Rome, be enrolled in one of the tribes, and vote like any other citizen. The *Socii* comprised all the rest of Italy, as the Hernicans, the Lucanians, Bruttians, the Greek cities, etc. All national or cantonal confederacies and alliances among the Italians were broken up, and no means were left unemployed by the victors to prevent their restoration.

The Punic Wars.—The origin of Carthage, and the steps by which she rose to power, are sketched in the article CARTHAGE. At the time when she came into collision with Rome she was indisputably the first maritime empire in the world, ruling as absolutely in the central and western Mediterranean seas as Rome in the Italian peninsular. Between the Carthaginians and the Romans there had long existed a nominal alliance—the oldest treaty dating as far back as the 6th c. B.C. But this alliance had never possessed any real significance, and latterly the two nations had come to regard each other with considerable distrust. The incident that occasioned the outbreak was quite trivial, and need not be recorded. Suffice it to say that in 264 B.C. war was formally declared between the two nations, and incomparably the most terrible contest in which Rome was ever engaged began.

We do not propose to follow minutely the course of the famous Punic wars—the details of which are narrated at sufficient length under the heads **Carthage**, **Hamilcar**, **Hannibal**, **Hasdrubal**, **Hiero**, **Regulus**, **Metellus**, **Fabius**, **Marcellus**, **Scipio**, and **Numidia**, to which we refer the reader, but we may briefly indicate their character and result. The wars with Carthage, like those with Samnium, were three in number. The *first* lasted 23 years (B.C. 264–241), and was waged mainly for the possession of Sicily. Its leading feature was the creation of a Roman navy, which, after repeated and tremendous misfortune, finally wrested from Carthage the sovereignty of the seas. Rome, indeed, had never been a merely agricultural state, as may be inferred from a variety of particulars—e.g., the antiquity of the galley in the city arms, of the port-dues on the exports and imports of Ostia, and of commercial treaties with transmarine states—but events had hindered it from engaging to any large extent in maritime enterprise; and its shipping, or at least its fleet, was still quite insignificant, although it had become master of nearly all the Italian seaboard. The necessity for a navy now began to show itself. Not only was there a difficulty felt in transporting troops to Sicily, but the shores of the main-land were completely exposed to the ravages of Carthaginian squadrons. So energetically did the senate set to work, that (we are told) in sixty days from the time the trees were felled, 120 ships were launched, and soon after the consul Caius Duilius gained a brilliant success (260 B.C.) over the Carthaginians off the Mylae, on the north-east coast of Sicily. The exultation of the Romans knew no bounds; and the "triumph" which Duilius received on his return to the city had more the aspect of a carnival than of a noble ceremony. The *Columna Rostrata* ("Beaked Column") in the forum preserved for ages the memory of the "glorious victory." Subsequent events, however, were less favorable. An invasion of Africa by Regulus (q.v.) ended in disaster, and the war, which was henceforth confined to Sicily, miserably languished. Thrice was the Roman navy annihilated by storms at sea (255 B.C., 253 B.C., and 249 B.C.); and in spite of a series of unimportant successes by land, the Romans long found it impossible to make any impression on the great Carthaginian strongholds of Lilybæum and Drepanum, mainly on account of the brilliant strategy with which they were held in check by Hamilcar Barca, the father of Hannibal. At last, however, a great sea-fight took place off the Ægates isles (242 B.C.), in which a Roman fleet, commanded by the consul Lutatius Catulus, obtained a magnificent victory. The Carthaginian government, whose treasury was empty, and who had in vain tried to raise a state-loan in Egypt, could—for the present—continue the struggle no longer, and the whole of Sicily, except the territory of Hiero of Syracuse, who had been a firm ally of the Romans, passed into the hands of the victors, who constituted it a Roman province, and placed it under the government of a prætor.—A lapse of 23 years occurred before the second Punic war began, but during that interval neither Romans nor Carthaginians had been idle. The former, with worse than "Punic faith," had bullied their weak and exhausted rival into surrendering Sardinia and Corsica, which, like Sicily, were transformed into a Roman province. In addition, they had carried on a series of Gallic wars in northern Italy (231–222 B.C.), the result of which was the complete humiliation of the barbarian Boii, Insubres, etc., and the extension of Italy to its natural boundary—the Alps. On the eastern coast of the Adriatic also, the Romans made their power felt by the vigor with which they suppressed Illyrian piracy (219 B.C.). Meanwhile, the descent of Hamilcar on the Spanish coast was followed, after some ineffectual opposition on the part of the natives, by the establishment of a new Carthaginian empire, or at least a protectorate, in the west; and thus, almost before the Romans were aware of it, their hated rival had made good her losses again, and was even able to renew the struggle in a more daring fashion than before. How confident the bearing of the Carthaginians had now become may be seen from the fearless spirit in which they accepted the Roman challenge, and entered on the *second* Punic—or (as the Romans called it) the *Hannibalic*—war, the grand events of which were the crossing of the Alps by Hannibal, the terrible disasters of the Romans at lake Trasimene (q.v.) and Cannæ (q.v.), and the final overthrow of Hannibal at Zama (q.v.), 202 B.C., by Scipio, which once more compelled the Carthaginians to sue for peace. It was with Carthage as with Samnium. The *second* war virtually sealed her fate, and the *third* displayed only the frantic heroism of despair. Her Spanish possessions, like her Sicilian, passed to the Romans (who formed out of them the provinces of *Hispania Citerior* and *Hispania Ulterior*); so did her protectorate over the Numidian sheiks. She was forced to surrender her whole navy (excepting ten triremes), and all her elephants, and to solemnly swear never to make war either in Africa or abroad, except with the consent of her vanquisher. In a word, the imperial supremacy of Rome was now as unconditional in the western Mediterranean as on the main-land of Italy. Her relations, indeed, to the conquered Italian nationalities became much harsher than they had formerly been, for, after the first victories of Hannibal, these had risen against her. The Picentes, Bruttii, Apulians, and Samnites were deprived either of the whole or the greater part of their lands—some communities were actually turned into serfs—the Greek cities in lower Italy, most of which had also sided with Hannibal, became the seats of burgess-colonies. But the loss of life and of vital prosperity was frightful. "Numbers of flourishing townships," says Mommsen, "400 it was reckoned, were destroyed and ruined." Slaves and desperadoes associated themselves in robber-bands, of the dangers of which an idea may be formed from the fact that in a single year (185 B.C.) 7,000 men had to be condemned for robbery in Apulia alone; the extension of the pastures with their half-savage slave-herdsmen favored this mischievous barbarizing of the land. But the exultation of victory closed the eyes and the ears of the Romans against every omen, and the perilous work of conquest and subjugation went on. During 201–196 B.C., the Celts in the valley of the Po, who, with the fiery unwisdom of their race, had recommenced hostilities at the very moment Rome was freed from her embarrassments, were thoroughly subjugated; their territory was Latinized, but they themselves were declared incapable of ever acquiring Roman citizenship; and so rapidly did their nationality dissolve that when Polybius, only 30 years later, visited the country, nearly all traces of Celtic characteristics had disappeared. The Boii were finally extirpated about 193 B.C.; the Ligurians were subdued 180–177 B.C.; and the interior of Corsica and Sardinia about the same time. The wars in Spain were troublesome and of longer duration, but they were not at all serious. The natives were indeed perpetually in arms, and the Romans suffered frequent defeats from their sudden and impetuous insurrections; but in the end the superior discipline of the legions always prevailed, and the fiery and chivalrous tribes had of course to make ignominious submission. So little reliance, however, could be placed on these forced submissions, that the Romans felt it necessary to hold Spain by military occupation, and hence arose the first Roman standing armies. Forty thousand troops were maintained in the Spanish peninsula year after year. The most distinguished successes were those achieved by Scipio himself, by Quintus Minucius (197–196 B.C.), by Marcus Cato (195 B.C.), by Lucius Æmilius Paullus (189 B.C.), by Caius Calpurnius (185 B.C.), by Quintus Fulvius Flaccus (181 B.C.), and by Tiberius Gracchus (179–178 B.C.).

Macedonian and Greek Wars.—The causes that led to the interference of Rome in the politics of the east are too complicated to be given here, but the *Macedonian wars* were owing immediately to the alliance formed by Philip V. of Macedon with Hannibal after the battle of Cannæ. Like the Samnite and Punic, the Macedonian wars were three in number. The *first* (214–205 B.C.) was barren of results, mainly because the whole energies of Rome were directed to Spain and lower Italy; but the *second* (200–197 B.C.), though it lasted only a third of the time occupied by the first, taught Philip that another and not he must rule in Greece. The battle of *Cynoscephalæ* ("Dogs' Heads" hills, a range in Thessaly) was followed by a treaty which compelled him to withdraw his garrisons from the Greek cities, to surrender his fleet, and to pay 1000 talents toward the expenses of the war. Philip was thoroughly quelled, and during the remaining 18 years of his life, he adhered (like old Hiero of Syracuse, though less sincerely) to his Roman alliance. But the miserable Ætolians, who had formed an alliance with Rome against Philip, with even more stupidity than insolence, quarreled in wanton jealousy with their powerful "friends," and persuaded Antiochus (q.v.) of Syria to come over seas to Thessaly, and fight them. A similar fate befell him to what had befallen Philip. After a war of three years he found himself obliged to surrender all his possessions in Europe and Asia Minor, all his elephants and ships, and to pay 15,000 Euboic talents (£3,660,000) within 12 years Next year the Ætolians were crushed, and a little later the despicable quarrels between the Achaians and Spartans led to a general Roman protectorate over the whole of Greece.

Philip of Macedon dying (179 B.C.), was succeeded on the throne by his eldest son Perseus (q.v.), who resolved once more to try the fortune of war with the Romans; and in 172 B.C., the *third* and *last* Macedonian war began, the result of which, after four years of fighting, was the utter destruction of the Macedonian army at Pydna (168 B.C.) by the Roman consul Lucius Æmilius Paullus (q.v.), the capture of the king, who adorned the triumph of the conqueror, and the dismemberment of the Macedonian empire, which was broken up into four oligarchic republics, the members of which were subjected to severe disqualifications; while in Greece itself, trials and executions for implication in the war of Perseus spread terror everywhere; the conspicuous "patriots"—i.e., all who had made themselves notorious by their anti-Roman and Macedonian policy—were deported to Italy; further, the imperial republic stopped Antiochus Epiphanes in his career of Egyptian conquest, ordered him instantly to abandon his acquisitions, and accepted the protectorate of Egypt, which the grateful and frightened monarch offered her (168 B.C.). Even the allies of Rome—the Pergamese, the Rhodians, etc.—were treated with shocking harshness and injustice. We may here, for the sake of connection, anticipate the course of history, and mention the last *Greek* and *Punic* wars. Both of these came to an end in the same year (146 B.C.). The former was caused by an expiring outburst of pseudo-patriotism in the Achaian league, consequent on the return of the exiles from Rome, and was virtually closed on the siege and destruction of Corinth (q.v.) by the consul Mummius. The latter was not so much a war as a bloody sacrifice to the genius of Roman ambition. After Hannibal's death his party in Carthage seems to have recovered the ascendency, and as coincident therewith, the commercial prosperity of the city began to revive, a bolder front was shown in resisting the encroachments of Masinissa, the Numidian ruler, whom the Roman senate protected and encouraged in his aggressions. This was enough. Fierce old Cato only expressed the instinctive sentiment of the Roman burgesses, when he came to utter incessantly *Delenda est Carthago*, and in 149 B.C. the senate adopted his barbarous conviction. After a siege of three years, in which the inhabitants displayed superhuman energy and heroism, Carthage was stormed by Scipio Africanus Minor, and the Carthaginian empire vanished forever from the earth.

Position of Rome at the close of the Punic Wars, and sketch of its subsequent Social Condition to the termination of the Republic.—"Polybius dates from the battle of Pydna the full establishment of the universal empire of Rome. It was in fact the last battle in which a civilized state confronted Rome in the field on a footing of equality with her as a great power: all subsequent struggles were rebellions or wars with peoples beyond the pale of the Romano-Greek civilization—the barbarians, as they were called. The whole civilized world thenceforth recognized in the Roman senate the supreme tribunal, whose commissioners decided in the last resort between kings and nations; and, to acquire its language and manners, foreign princes and noble youths resided in Rome." But contemporaneous with this enormous extension of power and authority in foreign lands, the national character underwent a complete and fatal alteration. The simplicity and stern integrity of life, the religious gravity of deportment, and the fidelity with which common civic and household duties were discharged—well expressed in the saying of Cato, that it was "better to be a good husband than a great senator"—which in early times nobly distinguished the Roman burgess, had now all but disappeared. Those hardy virtues—frugality, temperance, justice, and rectitude—which, combined with courage and energy, had given the strength to the nation that made it great, required for their permanence the social conditions out of which they sprang. But the class of peasant proprietors who had laid the foundations of Roman greatness were either extinct or no longer what they once had been. The original causes of their social degradation have been already noticed, and here it is only necessary to say that the victories of Rome abroad furthered rather than retarded that degradation. The long and distant wars made it more and more impossible for the soldier to be a good citizen or a successful farmer. The freedom and licentiousness of camp-life, the sweets of pillage and rapine, ever grew more pleasant to the Italian burgess and colonist; thus indolence, inaptitude, and spendthrift habits aided the greedy designs of the capitalists, and in most cases the paternal acres gradually slipped into the possession of the great landlords, who found it more profitable to turn them into pasture or cultivate them by gangs of slaves. The rise of the slave-system—though an inevitable result of foreign conquest—was, indeed, the most horrible curse that ever fell on ancient Rome, and the atrocities inflicted on its unhappy victims are far beyond the possibility of description; Mommsen does not exaggerate when he considers it probable that "compared with the sufferings of the Roman slaves the sum of all negro suffering is but a drop." If the Italian farmer honorably strove to retain his small farm he was exposed to the competition of the capitalists, who shipped immense quantities of corn from Egypt and other granaries, where slave-labor rendered its production cheap, and of course he failed in the unequal struggle. Not less pernicious was the change that passed over the character of the rich. We have already shown how the old Roman patricians lost their exclusive privileges, how the plebeians gradually acquired a full equality with them, and how the germs of a new social aristocracy originated, based on wealth rather than pedigree, and comprising both plebeians and patricians. During the 4th and 3d centuries B.C. the political power of this order immensely increased. In fact the whole government of the state passed into their hands. They became an oligarchy, and while it is not to be denied that they displayed extraordinary ability in the conduct of foreign affairs, the vices inseparable from oligarchic rule—selfishness, nepotism, and arrogance, of which Scipio is a striking example—gradually became rampant. Regarding themselves as the Roman community *par excellence* and the poor burgesses as a mere *canaille*, whose wishes and interests were unworthy of a moment's consideration, they virtually relapsed into the exclusiveness of the ancient *populus* with this difference for the worse, that their wealth, influence, and pride were a thousandfold greater than those of Coriolanus or Camillus. But far worse than even the nepotism and selfishness of the nobles was their ever-increasing luxury and immorality. When Rome had conquered Greece, and Syria, and Asia Minor, the days of her true greatness were ended. The wealth that poured into the state coffers, thence to be (really if not formally) distributed among the clique of nobles, the treasures which victorious generals acquired, enabled them to gratify to the full the morbid appetites for pleasure engendered by exposure to the voluptuousness of the east. Such results were, it is true, not brought about in a day, nor without a resolute protest on the part of individual Romans. The attitude of Cato Major toward the Hellenizing tendencies of his brother nobles was doubtless patriotic, and posterity has been generous in its laudation of his antique virtue; but Cato Major was nevertheless only a political fanatic and incarnate anachronism. So long as Rome chose to subdue foreign nations and to hold them by the demoralizing tenure of conquest—i.e., as mere *provinces*, whose inhabitants, held in check by a fierce and unscrupulous soldiery (like the Kabyles of Algeria by the French, or, until recently, the Hindus by the British), neither possessed political privileges nor dared cherish the hope of them—it was morally impossible for the citizens, either at home or abroad, to resume the simple and frugal habits of their forefathers. After Cato's time things grew worse instead of better, nor from this period down to the final dissolution of the empire was a single *radical* reform ever permanently effected. The momentary success of Tiberius and of his far abler brother, Caius Gracchus (q.v.), in their desperate and revolutionary attempts to prevent the social ruin of the state by breaking down the powers of the senate, redistributing the domain lands, reorganizing the administration, and partially restoring the legislative authority of the popular assemblies, hardly survived their death; and the reaction that ensued proved that the senate, like the Bourbons, could learn nothing from adversity, and that the rabble of the city were incapable of elevation or generosity of political sentiment. Henceforth the malversation of the public money by prætors and quæstors became chronic, and the moral debauchery of the mob of the capital by the largesses of ambitious politicians and the vile flattery of demagogues, complete. The old Roman faith, so deep, and strong, and stern, disappeared from the heart. The priests became Pharisees, the nobles "philosophers" (i.e., unbelievers), their wives practicers of oriental abominations under the name of "mysteries;" while the poor looked on with unmeaning, yet superstitious wonder at the hollow but pompous ceremonies of religion. It would serve no useful purpose to dwell longer on these aspects of Roman society, and we now turn to sketch in a few words the course of outward events to the close of the republic.

From the Destruction of Carthage to the Termination of the Republic.—We have already alluded to the wars waged in Spain during the first half of the 2d c. B.C. The humane and conciliatory policy pursued toward the natives by Tiberius Sempronius Gracchus, father of the ill-fated tribunes, brought about a peace, 179 B.C., that lasted 25 years; but in 153 B.C., a general rising of the Celtiberians took place, followed by another on the part of the Lusitanians of Portugal. The struggle maintained by these gallant barbarians against their mighty oppressor, lasted, with intervals of peace, for the space of 20 years, but ended, in spite of gleams of brilliant success, as such contests invariably do, in the final overthrow of the undisciplined and uncivilized combatant. All the valor of the shepherd-warrior Viriathus (q.v.), even if the assassin's steel had spared his life, would not have prevented the annexation of Lusitania to the Roman empire, nor did the unsurpassable heroism of the besieged Numantines avail to baffle the military skill of the younger Scipio.

Toward the conclusion of the Numantine war occurred the first of those horrible social outbreaks known as "servile" or "slave" wars, which marked the later ages of the republic. The condition of the slaves has been already referred to; but what aggravated the wretchedness of their lot was the fact that most of them had been originally freemen—not inferior in knowledge, skill, or accomplishments to their masters, but only in force of character and military prowess. The first slave insurrection broke out in Sicily, 134 B.C., where the system was seen at its worst. Its leader was one Eunus, a Syrian, who, mimicking his native monarch, took the title of king Antiochus. The suddenness and barbaric fury of the revolt for a time rendered all opposition impossible. The slaves overran the island, like demoniacs let loose; and routed one Roman army after another. But a slave insurrection has no aim beyond immediate revenge, and when the first wild paroxysms of ferocity are over, it becomes powerless, more even from a moral than a physical exhaustion, and can be quelled with ease. In 132 B.C. the consul Publius Rupilius restored "order" in the island. In the east, fortune continued to smile upon the Roman arms. Attalus III., Philometer, a villainous despot of the true oriental stamp, who massacred or poisoned every one that ventured to give him advice, dying 133 B.C., bequeathed his client-kingdom of Pergamus to its protector—Rome; and after a fierce struggle with an ambitious pretender called Aristonicus, the Romans obtained possession of the splendid bequest, and formed it into the province of Asia, 129 B.C.

We may here enumerate the different provinces into which the Roman senate divided its foreign conquests in the order of their organization. 1. Sicily, 241 B.C.; 2. Sardinia and Corsica, 238 B.C.; 3. Hispania Citerior, and 4. Hispania Ulterior, 205 B.C.; 5. Gallia Cisalpina, 191 B.C.; 6. Macedonia, 146 B.C.; 7. Illyricum, *circa* 146 B.C.; 8. Achaia (or Southern Greece), *circa* 146 B.C.; 9. Africa (i.e. the Carthaginian territory), 146 B.C; 10. Asia (kingdom of Pergamus), 129 B.C. A few years later, 118 B.C., an 11th was added by the conquest of the southern part of transalpine Gaul, and was commonly called, to distinguish it from the rest of the country, "the Province;" hence the modern *Provence*.

In Africa, the overthrow of Jugurtha (q.v.), 104 B.C., by the consul Marius, added yet further to the military renown and strength of the republic. Meanwhile, from a new quarter of the world, a gigantic and unforeseen danger threatened the Roman state. North of the Alps there had long been roaming in the region of the middle Danube an unsettled people called the Cimbri (q.v.), whose original home was probably the N.W. of Germany. They first came into collision with the Romans in Noricum, 113 B.C.; after which they turned westward, and poured through the Helvetian valleys into Gaul, where they overwhelmned alike the native tribes and the Roman armies. At Arausio (Orange) on the Rhone, 105 B.C., a Roman army of 80,000 was annihilated; but instead of invading Italy, the barbarians blindly rushed through the passes of the Pyrenees, wasted precious months in contests with native tribes of Spain as valiant and hardy as themselves, and gave the Romans time to recover from the effects of their terrible defeat. Marius, who had just returned from his Numidian victories, was reappointed consul; and at Aquæ-Sextiæ (Aix, in Dauphiné), he literally exterminated the dreaded foe, 102 B.C. Next year, near Milan, the same doom befell another northern horde—the Teutones, who had accompanied the Cimbri in their irruption into Spain; but on their withdrawal, had parted from their associates in Gaul, forced their way back through Switzerland,

and decended into Italy by the Tyrolese valleys. In the same year a second insurrection of the slaves in Sicily, which had reached an alarming height, was suppressed by the consul Marcius Aquillius.

For the next 10 years the internal history of Rome is a scene of wild confusion and discord. Marius, an admirable soldier, but otherwise a man of mediocre talents, and utterly unfit to play the part of a statesman, was the idol of the poor citizens, who urged him to save the state from the rapacious misgovernment of the rich. His attempts were pitiable failures; the brave honest soldier fell into the hands of unscrupulous demagogues like Glaucia and Saturninus, and sullied the laurels he had won in war by associating with men who did not hesitate to assassinate a political opponent. Not less fruitless was the wise and patriotic effort of Livius Drusus—"the Gracchus of the aristocracy"—to effect a compromise between the privileges of the rich and the claims of the poor. The oligarchic party among the former, i.e. the senate, were enraged by his proposition to double their numbers by the introduction of 300 equites; the latter by his offer to the "Latins" and "allied Italians" of the Roman franchise. Drusus fell 91 B.C., by the steel of a hired bravo. Hardly a year elapsed before the whole of the subject "Italians"—i.e., the Marsians, Pelignians, Marrucinians, Vestinians, Picentines, Samnites, Apulians, and Lucanians—were up in wild and furious revolt against Rome; and, though the rebellion was crushed in less than two years by the superior generalship of Marius, Sulla, and Pompeius Strabo (father of the "great" Pompey), the insurgents virtually triumphed; for the promise which Drusus had held out to them of the "Roman franchise," was made good by the *Lex Plautia Papiria*, 89 B.C. Yet the cost was terrible. It is calculated that 300,000 men—the flower of Rome and Italy—perished in the struggle; nor was even this tremendous holocaust sufficient to appease the fates. The jealousy that had long existed on the part of Marius toward his younger and more gifted rival, Sulla (q.v.), kindled into a flame of hate when the latter was elected consul 88 B.C., and received the command of the Mithridatic war—an honor which Marius coveted for himself. Then followed the fearful years of the "civil wars" between the two chiefs, 88–82 B.C., when blood was spilt like water; and proscriptions and massacres were the order of the day. It was a "reign of terror"—surpassing even the excesses of the French revolutionists. Sulla, the leader of the aristocracy, which was nominally the party of order, triumphed, but the ferocious energy displayed by the revolutionists convinced him that the "Roman franchise" could never again be safely withdrawn from the "Italians;" and Roman citizens, therefore, they remained till the dissolution of the empire; but, on the other hand, his whole legislation was directed toward the destruction of the political power of the burgesses, and to the restoration to the senatorial aristocracy and priesthood of the authority and influence they had possessed in the times of the Punic wars. That his design was to build up a strong and vigorous executive cannot admit of doubt, but the rottenness of Roman society was beyond the reach of cure by any human policy. It would be hopeless in our limits to attempt even the most superficial sketch of the complicated history of this period, which, besides, will be found given with considerable fullness of detail in the biographies of its leading personages, **Sertorius**, **Lucullus**, **Crassus**, **Pompey**, **Mithridates**, **Cæsar**, **Cicero**, **Catiline**, **Mark Antony**, **Lepidus**, **Cleopatra**, **Clodius**, **Brutus**, **Cassius**, **Cato**, and **Augustus**. The very utmost we can attempt is to enumerate results.

Abroad the Roman army continued as before to prove irresistible. About 18 years after the extermination of the northern barbarians, the Cimbri and Teutones, or in 88 B.C., broke out in the far east the first of the "Mithridatic wars," which, like the Samnite, Punic, and Macedonian wars, were three in number. Begun by Sulla, 88 B.C., they were brought to a successful close by Pompey, 65 B.C., although the gen. that had really broken the power of Mithridates was Lucullus. The result was the annexation of the sultanate of Pontus, as a new province of the Roman republic. Next year, Pompey marched southward with his army, deposed Antiochus Asiaticus, king of Syria, and transformed his kingdom also into a Roman province, while in the following year (63 B.C.) he reduced to a state of dependence Phenicia, Cœle-Syria, and Palestine, storming Jerusalem, and, to the horror of the Jews, violating their holy of holies. But what a terrible commentary it is upon these glittering triumphs to remember that during the same year there was hatched at Rome the conspiracy of Catiline (q.v.), which, if it had not been crushed by an extraordinary display of decision on the part of the consul Cicero, would have placed at least the city of Rome at the mercy of a crew of aristocratic desperadoes and cut-throats. One thing now becomes particularly noticeable, viz., the paralysis of the senate—that "governing board" as Mommsen calls it, that had once been the mightiest power in the world. In spite of all that Sulla did to make it once more the governing body in the state, the power passed out of its hands. Torn by wretched jealousies, spites, piques (personal and partisan), it could do nothing but squabble or feebly attempt to frustrate the purpose of men whom it considered formidable. Henceforth the interest as well as the importance of Roman history attaches to individuals, and the senate sinks deeper and deeper into insignificance, until at last it becomes merely the obsequious council of the emperors. The famous coalition of Crassus, Pompey, and Cæsar (known as the *first triumvirate*), which dates from the year 60 B.C., proves how weak the government and how powerful individuals had become; and the same fact is even more dismally brought out by the lawless and bloody tribunates of Clodius and Milo (58-57 B.C.), when Rome was for a while at the mercy of bravos and gladiators. The campaigns of Cæsar in Gaul (58-50 B.C.), by which the whole of that country was reduced to subjection; his rupture with Pompey; his defiance of the senate; the civil wars; his victory, dictatorship, and assassination; the restoration of the senatorial oligarchy; the second triumvirate, composed of Antony, Lepidus, and Octavian; the overthrow of the oligarchy at Philippi; the struggle between Antony and Octavian; the triumph of the latter, and his investment with absolute power for life (29 B.C.), which put an end at least to the civil dissensions that had raged so long (and was therefore so far a blessing to the state), are described in the biographical articles already referred to.

THE ROMAN EMPIRE.—When Augustus had gathered up into himself all the civil and military powers of the state, its political life was at an end; henceforth the voices of the citizens are dumb, and only the rude clamor of the legions or the prætorians (q.v.) is heard, as emperors rise and fall. It is, indeed, amazing to consider how long brute force managed to keep under the elements of anarchy and dissolution in the empire; but it must be remembered that it was the east that ruined Rome, and not Rome the east. Even in the worst days of the republic, the Roman adminstrators of the provinces were acknowledged to be less unjust, ravenous, tyrannical, and cruel than the native princes and sultans; and the servile myriads of Asia Minor and Syria witnessed the deposition of their dynasts without a shadow of regret—sometimes even with a cry of joy. The Romans had therefore comparatively little difficulty in retaining and even increasing their eastern conquests, while the superior discipline of their well-trained soldiery enabled them to repel and subdue even the intrepid barbarians of the north, though singly these were probably more gallant men than the rank and file of the imperial legions. But no military prowess, however great, will, beyond a certain time, serve to keep a nation alive that is otherwise moribund; and even Christianity, with all its antiseptic and revivifying influences, came too late to reanimate the national life of the empire. When Augustus died (14 A.D.), the Roman empire was separated in the n. from Germany by the Rhine, but it also included both Holland and Friesland; from about the lake of Constance it ran along the Danube to lower Mœsia, though the imperial authority was far from being firmly established there. In the e., the boundary-line was, in general, the Euphrates; in the s., Egypt, Libya, and, in fact, the whole of northern Africa, as far w. as Morocco, and as far inland as Fezzan and the Sahara, acknowledged Roman authority. The Roman franchise was extended to transmarine communities, and in the western provinces especially it became quite common. To keep this enormous territory,—containing so many different races—quiet an army of 47 legions and as many cohorts was maintained, most of whom were levied among the newly admitted burgesses of the western provinces. The reigns of Tiberius (q.v.), Caligula (q.v.), Claudius (q.v.), Nero (q.v.), Galba (q.v.), Otho (q.v.), and Vitellius (q.v.) present little of any moment in a general survey of the external history of the empire, though the chronicle of their lives—those of Galba and Otho, perhaps, excepted—has all the horrible and revolting interest that attaches to records of conspiracy, assassinations, poisonings, massacres, lust, debauchery, and delirious madness. The most notable incident of this period is probably the concentration of the prætorian guards in the vicinity of Rome during the reign of Tiberius, which Niebuhr even pronounces "the most momentous event in the history of the emperors;" and not without reason, for. until their dissolution by Diocletian, they were the real sovereigns of the empire. In Nero's time, Armenia was wrested from the Parthians, and only restored to them on condition of their holding it as a "fief" of the empire; the Roman authority in England was likewise extended as far n. as the Trent; and a great rebellion in Gaul (not, however, against Rome, but only against Nero), headed by Julius Vindex, a noble Aquitanian and a Roman senator, was crushed by T. Virginius Rufus, the commander of the Germanic legions. During the profound peace that the empire had enjoyed everywhere, except on its frontiers—since the usurpation of the imperial authority—its material prosperity had greatly increased. The population was more than doubled; the towns became filled with inhabitants, and the wastes were peopled, wherever, at least, the publicani (q.v.) or farmers-generals had not got the land into their rapacious hands; but the immorality of the rich, especially among the females, became yet worse than before, and virtuous men actually preferred concubinage with a slave, to marriage with a free-born Roman lady.

With the accession of Vespasian (q.v.) a better era commenced, which, if we except the reign of Domitian, continued uninterrupted for a space of 100 years, comprising the reigns, besides those mentioned, of Titus (q v.), Nerva (q.v.), Trajan (q.v.), Hadrian (q.v.), Antoninus Pius (q.v.), and Marcus Aurelius (q.v.). These were all men of fine and honorable character—some, as e.g., Trajan, Hadrian, and Marcus Aurelius, were really illustrious rulers, worthy of the best days of Rome. Under all of them the provinces were better governed, the finances better administered, and public morals wonderfully improved. Nothing, indeed, is more clear than that, after the time of Vespasian, that *restaurator rei publicæ*, as he has been justly called, the worst days of Rome (in a moral point of view) were over. Never again did she give way to the horrible sensuality, gluttony, and profligacy of the 1st century. Bad emperors she had as well as good, but they did not again succeed in corrupting their age. Blood, indeed, was shed freely enough, hostilities on the frontiers were as frequent as ever, and the violence and selfishness of military ambition were things that paganism did not seek, and had not the power, to quell; but the wild abyss of anarchy into which the empire latterly fell is less dreadful than the saturnalia of vice that filled the soul of Juvenal with indignation in the days of Domitian. How far the change was due to the influence of the ever-extending Christian religion it is impossible to tell; but that Christianity did send a reinvigorating breath of new life through the old decaying body of the state is beyond all dispute, and is written on the very face of the history of the first centuries. The chief military events, from the days of Vespasian to those of Marcus Aurelius, are the final conquest of Britain by Agricola (q.v.), the final conquest of the Dacian monarchy, the victorious invasion of Parthia and of northern Arabia; and the conquest of the valley of the Nile as far s. as upper Nubia, by Trajan; the chastisement of the Marcomanni, Quadi, Chatti, etc., by Marcus Aurelius. Hadrian's long rule of 21 years was peaceful, but is memorable as the most splendid era of Roman architecture. The reigns of Commodus (q.v.), Pertinax (q.v.), and Didius Julianus (q.v.) were insignificant, except in so far as they show us the wretched confusion into which the administration of affairs inevitably fell when bad, or hated, or feeble rulers were invested with the purple. Able generals, respectable jurists, honorable senators are not wanting, but their influence is personal and local. The reign of Septimius Severus (193–211 A.D.) is memorable as marking the first real change in the attitude of the emperors toward Christianity. The new religion was beginning to make itself felt in the state; and Severus, who was a Carthaginian, while his wife was a Syrian, may have felt a special interest in a faith that like themselves was of Semitic origin. At all events it was taken under the imperial protection, and began to make rapid way. Caracalla (q.v.) and Elagabalus (q.v.) are perhaps the worst of all the emperors in point of criminality; but the mad brutality of the one and the monstrous debauchery of the other were purely personal affairs, and were regarded with horror by the citizens of the empire. The reign of Alexander Severus is marked by the downfall of the Parthian dynasty of Persian kings, and the rise of the native Sassanidæ (q.v.), which, as Niebuhr observes, "was one of the unluckiest things that could have happened to the Roman empire," for the latter proved far more formidable enemies than the Parthian rulers. After the assassination of Severus (235 A.D.) followed a period of confusion, bloodshed, and general mismanagement. The names of Maximin (q.v.), Maximus (q.v.), Balbinus (q.v.), Gordianus (q.v.), and Philip (q.v.) recall nothing but wretched quarrels, often ending in assassination. Then followed "the beginning of the end." The whole of Europe beyond the Roman frontier—the mysterious north—began to ferment. The Franks showed themselves on the lower Rhine, the Suabians on the Maine; while the Goths burst through Dacia, routed the forces of Decius (q.v.), and slew the emperor himself at mount Hæmus, crossed the Euxine, and ravaged the whole northern coast of Asia Minor. A little later—during the reigns of Valerian (q.v.), Gallienus, and the so-called *thirty tyrants*—the empire is nothing but a wild distracted chaos, Franks, Alemanni, Goths, and Persians rushing in from their respective quarters, like vultures scenting prey. The Goths swept over the whole of Achaia, pillaging and burning the most famous cities—Athens, Corinth, Argos, etc.; while the Asiatic hordes of Sapor committed even greater havoc in Syria and Asia Minor; and but for the courage and skill of Odenathus, husband of Zenobia (q.v.), who had built up a strong independent kingdom in the Syrian desert, with Palmyra for its capital, might have permanently possessed themselves of the regions which they merely devastated. With Claudius Gothicus (268–270 A.D.), the fortunes of the empire once more begin to brighten. By him, and his successors Aurelian (q.v.), Probus (q.v.), and Carus, the barbarians of the n. and n.w., as well as the Persians in the e. were severely chastised. Nay, when Diocletian obtained the purple (284 A.D.), it seemed as if the worst were over, and the empire might still be rescued from destruction; but his division of the empire into east and west, with separate *Augusti* and assistant *Cæsars*—though it sprang from a clear perception of the impossibility of one man administering successfully the affairs of so vast a state—led to those labyrinthine confusions and civil wars, in which figure the names of Maximian (q.v.), Constantius (see CONSTANTINE), Galerius (q.v.), Maxentius (q.v.), Maximin (q.v.), Licinius (q.v.), and Constantine, and which were only brought to a close by the surpassing genius of the last-mentioned. Under Constantine (324–337 A.D.), as all the world knows, occurred the greatest revolution in Roman history since the birth of Christ—viz., the establishment of Christianity as the religion of the state. He also transferred the seat of government from Rome to Byzantium on the Bosporus, where he founded a new city, and named it after himself. But no sooner was the great statesman dead than the mutinous discords that he had kept under by the vigor of his rule, broke loose; the empire underwent a triple division among his sons; and though Constantius, the youngest, ere long became sole ruler, he failed to display the genius of his father, and in his repeated campaigns against the Persians reaped nothing but disaster and disgrace. But the political fortunes of the empire now possess only a secondary interest; it is the struggles of the Christian sects and the rise of the Catholic church that mainly attract the attention of the historian. There, at least, we behold the signs of new life—a zeal, enthusiasm, and inward strength of soul that no barbarism could destroy. Christianity came too late to save the ancient civilization, but it enabled the Roman world to endure three centuries of utter barbarism, and afterward to recover a portion of the inheritance of culture that it once seemed to have lost forever. Julian's attempt to revive paganism was a lamentable anachronism, but his efforts, when governor of Gaul under his kinsman Constantius, to repel the incessant incursions of the Franks and Alemanni, displayed a fine valor and generalship, and were crowned with success. The judgment of the poet Prudentius on the apostate is that of posterity: *Perfidus ille Deo, sed non et perfidus orbi.* But after the death of Julian, the signs of the approaching dissolution of the empire became more unmistakable. Yet the great state was, if we may so speak, loath to die; and again and again in her death agony, she put forth a momentary strength that amazed her foes, and taught them that even the expiring struggles of a giant were to be feared. Valentinian (q.v.), Gratian (q.v.), and Theodosius (q.v.) were rulers worthy of better times. The last-mentioned is even known to history as the "great." But they fought against destiny, and their labor was in vain. Already swarms of ferocious Huns (q.v.) from the east had driven the Goths out of Dacia, where they had long been settled, and forced them to cross the Danube into the Roman territory, where the cruelty and oppression of the imperial officers goaded the refugees into insurrection; and in their fury, they devastated the whole east from the Adriatic to the Euxine. Theodosius indeed subdued and even disarmed them; but he could not prevent them from drawing nearer to the heart of the empire, and already they are found scattered over all Mœsia, Servia, and northern Illyricum. Hardly was Theodosius dead when they rose again, under their chief, Alaric (q.v.), against Honorius, emperor of the west. Rome was saved (for the moment) only by the splendid bravery and skill of Stilicho (q.v.), the imperial gen.; but after his assassination, the barbarians returned, sacked the city (410 A.D.), and ravaged the peninsula. Three years earlier, hordes of Suevi, Burgundians, Alemanni, Vandals, and Alans burst into Gaul (where the native Celts had long been largely Romanized in language and habits), overran the whole, and then penetrated into Spain, where a Vandal empire was rapidly set up. It is utterly impossible (within our limits) to explain the chaotic imbroglio that followed in the west—the struggles between Visigoths and Vandals in Spain, between Romans and both, between usurpers of the purple and loyal generals in Gaul—the fatal rivalries of those otherwise noble and gifted men—Boniface, governor (*comes*) of Africa, and Ætius, governor of Gaul—which led to the invasion of Africa by Genseric (q.v.), and its devastation from the straits of Gibraltar to Carthage (429 A.D.). While such was the state of affairs in the west, things were not a whit better in the east. There the Huns, from mere love of havoc, had reduced vast regions to an utter desert; for nearly 50 years, indeed, the little ferocious demons had rioted in destruction. At last, a trivial quarrel sent them into Gaul; but somewhere in Champagne they were routed with great slaughter (451 A.D.) by a combined force of Visigoths, Burgundians, Franks, and Roman mercenaries, under Ætius and Theodoric, king of the Goths; and in spite of their successful invasion of Italy in the following year, their strength was permanently broken, and henceforth they play an insignificant part in history. But Ætius, the only man who could have decently propped up the wretched ruin called the western empire, was assassinated by his contemptible sovereign Valentinian, whose own outrages led to his murder too; while his widow, Eudoxia, to be revenged on his murderer and successor, Petronius Maximus, invited Genseric, the "scourge of God," over from Africa, and exposed Rome to the horrors of pillage for 14 days. Ricimer, a Sueve, next figures as a sort of governor of the city, and what relics of empire it still possessed, for Gaul, Britain, Spain, western Africa, and the islands in the Mediterranean, had all been wrested from it. While Majorian—the last able emperor—lived, Ricimer's position was a subordinate one, but, thenceforth, the western emperor merely was an emperor in name—a *roi faineant*—while the real sovereignty was exercised by this Suevic *maire du palais*, who was succeeded in his functions by the Burgundian king Eunobald, and the latter again by Orestes, in whose time the final catastrophe happened, when Odoacer (q.v.), placing himself at the head of the barbarian mercenaries of the empire, overthrew the last, and the most ridiculous occupant of the throne of the Cæsars (476 A.D.), who, by a curious coincidence, bore the same name as the mythical founder of the city—Romulus. See, besides the ancient histories of Polybius, Livy, Sallust, Tacitus, etc., the modern histories of Gibbon, Niebuhr, Arnold, Merivale, Mommsen, and Ihne.

ROME, the capital of ancient Italy, stood on the left bank of the Tiber, about 16 m from the sea. The legend of its origin belongs to Roman history, and is discussed partly under that heading, and partly in the article ROMULUS. It was built at first in the form of a square (*Roma Quadrata*), and gradually extended, until, in the reign of Servius Tullius, it embraced one after another the famous seven hills—viz., the Palatine, Capitoline, Quirinal, Cælian, Aventine, Viminal, and Esquiline. Servius Tullius (according to the legend) so extended the *pomœrium* as to make the sacred inclosure of the city identical with its walls. After its first destruction in 390 B.C. by the Gauls, it was hastily rebuilt without respect to order, and with narrow irregular streets. At the close of the wars against Carthage, Macedonia, and Syria, public buildings and private houses of great architectural beauty were added; and under Augustus, improvements of a similar kind were made, while the mean and narrow streets were allowed to stand. In the reign of Nero, 64 A.D., two-thirds of the city were destroyed by fire, a catastrophe which furnished that emperor with the opportunity of gratifying his architectural predilections, in widening and straightening the streets, and in restricting the height of the houses, of which a certain part was built of fireproof stone from Gabii and Alba. Although it had long outgrown the limits prescribed by Servius Tullius, still the walls of that king marked the extent of Rome properly so called down to the 3d c. A.D. Under Aurelian, however, the need of fortifications led to the construction of new walls, which took in the city of Servius Tullius with all the suburbs, such as the Mons Janiculus on the right of the Tiber, and the Pincian on the left. These walls, begun 271 A.D., were completed by the next emperor, Probus, were 11 m. in circumference, and were afterward restored by Honorius, and partially rebuilt by Belisarius.

Extent and Population of Rome.—Under Servius Tullius the walls were 7 m. in circumference, but the space which they comprised was not entirely occupied by buildings. Under Aurelian the new walls were 11 m. in circumference, and the city went on extending until it reached a circumference of 13 m. under Vespasian. The population at any given period cannot be exactly determined. According to the *Monumentum Ancyranum*, the *plebs urbana* under Augustus amounted to 320,000; with the addition of women, senators, and knights, the inhabitants must have numbered about 650,000; while the slaves, who cannot have been less numerous than the free population, must have given an aggregate of at least 1,300,000. Considering the enlargement of the city under Vespasian we may safely set its population down at not less than two millions in his reign.

The Walls and Gates.—The first wall, that attributed to Romulus, embraced merely the Palatine, and was pierced by three gates. The larger wall of Servius Tullius does not appear to have been continuous, but only to have connected the seven hills by fortifications drawn across the narrow valleys intervening. According to Pliny there were 37 gates in this wall. Subsequent to the walls of Servius were those of Aurelian, which, with the exception of the part beyond the Tiber, are the same as those which surround the modern city. They were divided by 14 gates. The Tiber was crossed by eight bridges.

In the interior of the city were several open spaces of ground, paved with stones, which were used as places of business or as market-places, and were called *fora* (see FORUM.) Besides these there were other open spaces of much larger extent, which were grass-grown, and set with trees and works of art. Of these, which were called *campi*, and were used by the people in their exercises and amusements, the chief was the Campus Martius. Surrounding these fora and campi were the private and public buildings of Rome, which were arranged in streets and districts. The chief street was the celebrated Via Sacra, remains of which are still to be seen in the Forum of modern Rome.—Rome contained no fewer than 400 temples, the oldest being the temple of the Feretrian Jupiter on the Capitoline, which was built, according to tradition, by Romulus, and restored by Augustus. The most famous in history, and the most magnificent in architecture, was the Capitolium, placed on the summit of the Capitoline (see CAPITOL.) The only other temple requiring special mention was the Pantheon (q.v.), built by Agrippa, 27 B.C. It is still standing.—For other striking features of the ancient city, see CIRCUS, AMPHITHEATER, BATH, BASILICA.

Rome also abounded in covered walks, supported by columns, and open on one side. These were known as *porticus*, and were frequented for the purposes of recreation, or of transaction of business. They were in many cases adorned with paintings and other works of art, and furnished with libraries.—More peculiar to ancient Rome, however, were the triumphal arches. See ARCH, TRIUMPHAL.—The great prison of Rome was the Carcer Mamertinus, built by Ancus Martius on the slope of the Capitoline, which overhangs the Forum. Servius Tullius added to it a subterranean dungeon, 12 ft. underground, walled and arched over with masonry.—In addition to the prisons we may mention the barracks (*castra*), such as the Castra Prætoria, built by the emperor Tiberius for the imperial guards: and the Castra Peregrina, where the foreign troops were quartered; the aqueducts (see AQUEDUCT); and the sewers (see CLOACA MAXIMA).

Rome also abounded in palaces (*palatia*). Of these the Palatium, or imperial palace, fronting the Forum, was so enlarged by Augustus that, from being the private house of Hortensius the orator, it became the imperial residence. Nero built two still more splendid palaces, one which covered the whole Palatine hill and part of the Esquiline, and was burned down in the great fire; and one which replaced the other. Many of the private palaces were also on a magnificent scale.—On the hills around the city were laid out *horti*, or parks and gardens, and were adorned with handsome building and works of art.—Rome was also rich in sepulchral monuments. See ROMAN ARCHITECTURE.—In addition to these imperial or private mausolea, columns were also erected to the more illustrious of the Romans, such as the Columna Rostrata, in honor of the consul C. Duilius for his victory over the Carthaginian fleet; the Columna Trajani, in the Forum; and the Columna Antonini Pii in the Campus Martius.—Obelisks (q.v.), mostly transported from Egypt, occupied prominent parts of the city. Since Rome has again become the capital of Italy extensive excavations among the ruins have been carried on upon a systematic plan, and with interesting results.

Modern Rome occupies the plain on each side of the Tiber and the slopes of the seven hills. Its geographical position at the observatory of the collegio Romano is lat. 41° '53 52" n., long. 12° 28' 40" e., and its height above the level of the sea on the Tiber under the Ælian bridge is 20 feet. Pop. Dec. 31, 1871, 229,356; that of the commune, 244,484. The members of religious orders in 1867 were 7,400, including 30 cardinals, 35 bishops, 2,832 monks, and 2,215 nuns. It contained 4,650 Jewish residents, still compelled to inhabit a particular quarter, called the Ghetto. 50,000 persons were then in receipt of public alms.

The city is built on marshy ground, and is divided by the Tiber into two very unequal parts, that on the left bank being Roman proper, and that on the right bank being the Leonine city, or Trastevere. Its walls, 12 m. in circuit, and containing 16 gates, of which 4 are built up, inclose a space of which little more than one-third is inhabited, the greater part to the s. of the capitol being cultivated as gardens or vineyards. The site of the ancient Campus Martius constitutes the lower and most densely populated part of the town, in which all the trade is carried on. Its central part is crossed by the Corso, a street about 1 m. long, and running from the Piazza del Popolo, or great northern entrance of Rome, to the Palazzo di Venezia, at the foot of the capitol. From the Piazza del Popolo a handsome open space, with an obelisk from the temple of the sun at Heliapolis in the middle, branch out to the right and left of the Corso, the Piazza di Spagna, the favorite quarter of foreigners, and the Ripetta. More than half-way up the Corso, and to the right, runs the wide street or Strada del Gesù, leading to the noble church and convent of that name, the chief residence of the order of the Jesuits. On either side of the Corso the buildings are regular and substantial, and consist of palaces, such as the Borghese, the Ruspoli, the Ghigi, and others, besides many churches. Between the Corso and the Tiber, to the w., the streets are irregular, densely peopled with inferior tradesmen, and consisting mainly of market-places, shops, and dwellings of a low class. In this quarter is the university La Sapienza, between which and the Corso is the Rotunda or Pantheon. South of Ponte Sisto, on the left bank of the Tiber, and winding round the western base of the capitol to the foot of the Palatine, is the Ghetto, or Jews' quarter, consisting of narrow dirty alleys, with rows of high old houses. Still further s., and on the left bank of the Tiber, runs a series of narrow streets as far as the Palatine, containing some of the oldest churches in Rome, such as the Santa Maria in Cosmedin, built in the 3d century. Beyond this extend to the s.e. the Aventine, Palatine, and Cælian hills, which are covered with gardens, vineyards, and orchards, besides churches, convents, and ruins. At the eastern extremity of the Cælian stands the magnificent basilica of San Giovanni in Laterano. To the s. of the Aventine, and between it, the river, and the walls, are the Prati del Popolo Romano, forming part of a large space of low-lying cultivated ground. Near the Prati lies the Protestant cemetery.

On the slope of the Pincian and Quirinal hills, and covering part of the plateau which joins all the eastern hills of Rome, lies the upper town, consisting mainly of palaces, villas, churches, convents, and other buildings on a large scale. It abounds with ample courts and gardens, and is crossed by two long streets, which intersect each other at right angles on the crest of the Quirinal. The Pincian is laid out in fine walks, which are the favorite promenade of the Romans; while between the Pincian and the Quirinal stands the great Barberini palace. On the summit of the Quirinal is the famous pontifical palace and garden; and in the square before the palace are the two colossal statues of Castor and Pollux, with their horses, whence the hill receives its other name of Monte Cavallo. On the Esquiline, which here joins the Quirinal, and forms the eastern extremity of the city, stands the magnificent church of St. Maria Maggiore; beyond it to the n., e., and s., the Esquiline is entirely covered with gardens, villas, and fields, with here and there a church. The principal buildings on the capitol are three palaces, the work of Michael Angelo, which form three sides of a square, in the center of which stands the equestrian statute of M. Aurelius Antoninus. One of the palaces is the Capitoline museum, one of the finest collections of statuary and sculpture in Italy.

The third great division of the modern city lies on the right bank of the river, and is subdivided into two parts—the Vatican (otherwise called Il Borgo) and the Trastevere. Divided from the latter by an inner wall, the Borgo or Leonine city occupies the space between the bridge of St. Angelo and the piazza of St. Peter's. Its chief buildings are the palace of the Vatican (q.v.), and the basilica of St. Peter's (q.v.). Besides the Vatican and St. Peter's, the Leonine city contains the great hospital of the Santo Spirito, which accommodates annually 13,500 patients laboring under all diseases, whether mental or bodily. The castle of St. Angelo, with massive circular tower, called from its founder the "Mole of Hadrian," is surrounded with ramparts, ditches, and bastions, mounted with cannon, and forms the citadel of Rome.

To the s. of the Borgo, and between the Janiculum and the Tiber, is the Trastevere, properly so called. The Janiculum, a straight ridge, about a mile and a half long from n. to s., rises about 300 ft. above the level of the river. The northern half of its length is occupied by the long street called the Lungara, running closely parallel to the Tiber, which at the southern extremity of the Lungara, makes a bend to the e., and bounds the greater part of the Trastevere district. On the Janiculum is the villa Spada, near the gate, outside of which is the villa Pamfili, a favorite promenade of the Roman youth. On the same hill, the fountain called L'Acqua Paola, the largest in Rome, occupies a command.

ing site, and, as seen from a distance, resembles a triple triumphal arch, through which streams of water rush.

The churches, of which there are upward of 300, form a notable feature in Rome, from their architecture, their paintings, and other decorations. So also are the palaces of the aristocracy, which are often of great magnitude, with vast courts and spacious apartments. Of even better style as residences are the villas, both within and without the walls; while the handsome fountains, of which there are at least 12 principal ones, impart a cheerful and refreshing aspect to the city. There are three modern aqueducts, which keep Rome supplied with abundance of water; the Acqua Vergine, the Acqua Felice (the ancient Acqua Marcia and Claudia), and the Acqua Paola (the ancient Alsietina).

Rome, is on the whole, a healthy city, except at the close of summer and the beginning of autumn, when the malaria is prevalent. The Trastevere is its most uniformly healthy district, the inhabitants of which are superior in physical development to those of the other parts. The neighborhoods of the Pincian and the Quirinal, particularly the former, are most frequented by Englishmen. The trade of the city is insignificant, consisting of a few trivial manufactures of hats, silk scarfs, gloves, artificial feathers, false pearls, mosaic trinkets, etc., and of such articles as artists need and visitors fancy. The only great manufacture, if it can be called so, is that of pictures, original and copied; for the painting of these, Rome offers not only the advantage of numerous galleries of art, but purity of sky. The worst feature of Rome is its dirtiness. In Oct., 1870, Rome, along with the rest of the papal territory, was annexed to the kingdom of Italy, and is now the capital. The pope retains the rights of a sovereign within the Vatican.

ROME, a city, co. seat of Floyd co., Georgia; on the Selma, Rome and Dalton railroad; 60 m. n.w. of Atlanta at the junction of the Etowah and Oostenaula rivers, forming the Coosa; pop. '70, 2,748—1,005 colored. Rome was incorporated in 1848, and was occupied by Sherman when he was moving on Atlanta. The place derives most of its importance from its position near many rich iron mines, and contains a rolling-mill, machine-shops, and iron foundries; and there are six blast furnaces not far distant. The Coosa is navigable to this point.

ROME, a township and village of New York, on the Mohawk river, Erie canal, Black River canal, and New York Central railway, 100 m. n.w. of Albany. It contains a U. S. arsenal, court-house, jail, academy, 15 churches, 2 newspapers, and numerous manufactories. Pop. '70, 11,000; '75, 12,511.

ROME (*ante*), a city in central New York, incorporated 1870; at the junction of the New York Central, the Rome, Watertown and Ogdensburg, and the Rome and Clinton railroads; pop. '80, 12,045. It is 15 m. n.w. of Utica, and 88¼ m. n.e. of Syracuse, at the head of the Mohawk valley. It stands the only land interrupting direct water communication between the Atlantic and the western lakes, and was formerly called *the carrying place*, i.e., the place where the boats were carried across. The town is regularly built on wide thoroughfares, crossed by streets at right angles, shaded in summer by beautiful trees. It has good educational facilities, a public library, 5 banks, and the Central New York institution for deaf mutes. The water supply is brought from the Mohawk river by works established in 1873. The battle of Oriskany was fought in the vicinity, fort Stanwix, besieged by the British in 1777, occupying the center of what is now the city. It was here that cheese was first made in factories; other manufactures are locomotives, agricultural implements, railroad iron, cigars, and patent medicines.

ROMEYN, JOHN BRODHEAD, D.D., 1777–1825; b. N. Y., graduated at Columbia college in 1795; studied theology and became pastor of the Reformed church, Rhinebeck, N. Y., 1799; of the Presbyterian church, Schenectady, 1803; of the First Presbyterian church, Albany, 1804; and in 1808 of the Cedar street Presbyterian church in New York, where he remained till his death. As a preacher he was among the foremost of his day. His ministry was very successful. His catechetical classes were crowded, and many young men became ministers from his congregation. Two vols. of his sermons were published. He was a trustee of Princeton college; active in the formation of the theological seminary, and was one of its directors; was one of the founders of the American Bible society in 1816, and its first domestic secretary.

ROMFORD, a market-t. in the co. of Essex, stands on the river Bourne, or Rom, 12 m. from London, on the Great Eastern line. The annual horse-fair commences on midsummer day, and lasts three days. There are extensive breweries of the famous "Romford ale." Agricultural implements are largely manufactured. Pop. '71, 6,335.

ROMILLY, Sir SAMUEL, English lawyer and law reformer; b. Mar. 1, 1757; was descended from a family of French Protestants, who, after the revocation of the edict of Nantes, emigrated to England. At the age of 16 Romilly was articled to Mr. Lally, one of the sworn clerks in chancery; and at 21 he entered himself at Gray's inn. At first he made little progress in his profession; but after a time he began to apply himself to the study of criminal law; and in 1789 entertaining, like many other English liberals, a sanguine expectation of the happy effects of the French revolution, he published a short pamphlet on the subject. In 1792, and again in 1795, he declined lord Lansdowne's offer of a seat for Calne. In 1806 he was, at the instance of Mr. Fox, appointed solicitor-general in the Grenville administration. He unwillingly received the honor of knighthood; but the king having, for the last 20 years, knighted all his attorneys and solicitors-general on their appointment, would take no refusal. He was afterward returned for Queenborough, was one of the manager's of lord Melville's trial, and passed a bill to amend the bankrupt laws. In 1807 he went out of office, and was elected for Horsham, but being unseated, was returned for Wareham. He now devoted himself to ameliorate the severity of the criminal law, and proposed the abolition of the punishment of death in various cases of theft. He also published a pamphlet *On the Criminal Law as it relates to Capital Punishments.* His bills were, session after session, opposed by the government of the day, the judges, and many of the bishops, as dangerous innovations; but Romilly nevertheless persevered, and lost no opportunity of protesting against the severity and frequency of capital punishments. The measures he proposed for mitigating the severity of the criminal law were, for the most part, carried by others; but he framed an act for rendering the punishment of high treason less barbarous, and another for taking away corruption of blood, as a consequence of attainder of felony. He took an active part in the anti-slavery agitation, and in opposing the suspension of the habeas corpus act, the spy system, and the despotic acts of the government. In 1818 he was spontaneously chosen by the electors of Westminster as their representative. The death of his wife, following upon prolonged mental exertion, preyed upon his mind, and three days afterward (Nov. 2, 1818), he died by his own hand. He had at this time attained the foremost rank at the chancery bar, and his professional gains were said to average £14,000 a year. His death excited profound sympathy, and was considered a public calamity. His *Speeches in Parliament* have been published in two vols.; and his autobiography, with a selection from his correspondence, admirably edited by his sons, has also been published in two vols.—His second son, Baron Romilly, educated at Trinity college, and called to the bar at Gray's inn, 1827, was made solicitor-general in 1848, attorney-general in 1850, master of the rolls in 1851, and created a baron in 1866. As master of the rolls Romilly incidentally rendered great services to his country, by superintending the publication of public records tending to throw much light upon English history and events. He died on Dec. 23, 1874.

ROMMANY LANGUAGE. See Gypsies, *ante.*

ROMNEY, George, 1734–1802; b. Lancashire, England. His father was a cabinet-maker, but young Romney displayed such taste for drawing that he was apprenticed to a portrait-painter. For several years he was a portrait-painter in Westmoreland. In 1763 he came to London, and his first historical picture, "Death of King Edmund," received a prize from the society of arts. He studied in Italy, and on his return was patronized by many of the nobility, and made a large income by his profession. He was a man of great eccentricity, and left much unfinished work. "Milton Dictating to his Daughters," and "Titania with her Indian Votaress," are considered his best pictures.

ROMORANTIN, a small t. of France, in the dep. of Loir-et-Cher, 25 m. s.e. of Blois. At the siege of this town by the Black Prince in 1356, artillery is said to have been first used. Various woolen fabrics are manufactured. Pop. '76, 7,436.

ROM'PU, in heraldry, a term applied to a chevron when the upper part is taken off, and remains above it in the field.

ROM'ULUS, the mythical founder of the city of Rome. His name is only a lengthened form of Romus, and he is therefore to be regarded rather as a symbolical representation of the Roman people than as an actual individual, like Æolus, Dorus, and Ion, the eponymous ancestors of the Æolians, Dorians, and Ionians. But though the legend of Romulus cannot be accepted as history in its details or its outlines, it is nevertheless interesting to know how, after the lapse of years, when Rome had become a place of importance, its inhabitants tried to conceive a probable origin for it. We will therefore relate the story of Romulus as it is usually given. At Alba Longa, in Latium, there had ruled for some centuries a line of kings descended from the Trojan prince, Æneas. One of the latest of these, at his death, left the kingdom to his eldest son, Numitor. Amulius, a younger brother of Numitor, who was ambitious, deprived the latter of the sovereignty, murdered his only son, and compelled his only daughter, Silvia (generally, but incorrectly, called Rhea Silvia), to become a vestal virgin, thereby hoping to secure immunity for his crime. But Silvia having become the mother of twins by the god Mars, his fears were aroused, and he resolved to drown all the three. A cradle containing the babes was thrown into the Anio, whence it was carried into the Tiber. That stream was then in flood, and had overspread its banks far and wide. The cradle was stranded at the foot of the Palatine, and the infants thus wonderfully saved from death by drowning, were no less wonderfully saved from death by hunger. A she-wolf carried them into her den, near at hand, and suckled them, while a woodpecker brought them whatever other food they wanted. This marvelous spectacle was at length beheld by Faustulus, the king's shepherd, who bore the infants home to his wife, Acca Larentia, and had them brought up with his own children. A strife having one day arisen between them and the herdsmen of Numitor, who stalled their cattle on the Aventine, Remus, one of the twins, was taken prisoner, and carried off to Numitor. When the latter looked on the youth, he could not help thinking of his grandsons; and the story of the miraculous preservation of the twins strengthened the suspicions that were beginning to form in his mind. Romulus now made his appearance, accompanied by his foster-father; an *éclaircissement* took place; Numitor acknowledged the boys as the sons of his daughter Silvia, and they immediately proceeded to avenge the family wrongs, by slaying Amulius, and placing their grandfather on the throne. But, continues the legend, Romulus and his brother did not care to remain in Alba Longa; they loved their old abode on the banks of the Tiber, and resolved to build a city there. The Palatine was chosen (by augury) for the site, and Romulus, yoking a bullock and a heifer to a plowshare, marked out the *pomœrium*, or boundary, on which he proceeded to build a wall. Remus laughed at the idea of keeping off enemies by such means, and to show its inefficiency, scornfully leaped over it, whereupon Romulus slew him, but was immediately struck with remorse, and could obtain no rest till he had appeased the shade of his brother by instituting the *lemuria*, or festival for the souls of the departed. The next thing which Romulus did was to erect a "sanctuary" on the Capitoline for runaway slaves and homicides, and by this means he soon increased the number of his followers; but as wives were much wanted, Romulus tried to obtain them legally from the neighboring states. His efforts, however, failed: a "runaway slave" not being considered a desirable match for his daughter by a Latin or Sabine paterfamilias, and he was compelled to have recourse to stratagem. This led to the celebrated *Rape of the Sabine Women*, the incidents of which are too familiar to require narration. The consequence of this wholesale abduction of virgins was a series of wars, in which, however, Romulus was invariably victorious, until Titus Tatius, at the head of a large army of Sabines, drove him from the open fields, and forced him to take refuge in his city on the Palatine. Romulus had also garrisoned the Capitoline, but the treachery of Tarpeia, a daughter of a lieutenant of the fort, placed it in the hands of his adversaries. Next day a battle took place in the valley between the two hills. It was long and fiercely contested. Sabines and Romans fought till they were exhausted, when the Sabine women rushed in between their husbands and fathers, and implored them to be reconciled. This was agreed to, and henceforth they resolved to unite and to form only one people—the followers of Romulus dwelling on the Palatine, those of Titus Tatius on the Capitoline and Quirinal. On the death of Titus Tatius, who was murdered at a festival held at Lavinium, Romulus became sole sovereign, and subsequently—according to a later legend—made successful war against the Etruscan cities of Fidenæ and Veii. The political organization of the Roman *populus* ascribed to Romulus is given under ROME. After a reign of 87 years, Romulus was miraculously removed from earth. While he was standing near the "Goat's pool," in the Campus Martius, reviewing his militia, the sun was eclipsed, and a dark storm swept over the plain and hills. When it had passed, the people looked round for their king, but he was gone. His father, Mars, had carried him up to heaven (like the prophet Elijah) in a chariot of fire. Some time after he reappeared in a glorified form to Proculus Julius, announced the future glory of the Roman people, and told him that henceforth he would watch over them as their guardian god, under the name of Quirinus. The festival of the Quirinalia (Feb. 17) was instituted in his honor; but the nones of Quintilis (July 7) was the day on which he was believed to have departed from earth.

ROM'ULUS AUGUS'TULUS. See ODOACER.

RO'NALDSHAY, NORTH AND SOUTH, two of the Orkney islands (q.v.). *North R.*, situated at the n. extremity of the Orkneys, has an area of 4 sq.miles. It is partly under tillage, and partly in pasture. Sea-birds in great variety frequent the coast, and lobsters and cod are fished. Pop. '71, 539.—*South R.*, washed on the s. by the Pentland firth, has an area of about 18 sq.miles. St. Margaret's Hope, on the n. coast, is a safe and convenient harbor. The inhabitants derive their subsistence for the most part from fishing for cod and herrings. Pop '71, 2,501.

RONCESVALLES, one of the valleys in Navarre, on the southern side of the Pyrenees, about 20 m. n.n.e. of Pamplona, has been rendered famous in poem and story as the scene of a defeat sustained by the army of Charlemagne at the hands of a combined force of Arabs, Navarrese, and French Gascons in 778. Charlemagne, allured by the promise of the feudal supremacy of Catalonia, opened a campaign in aid of the viceroy of that province against the Mohammedans. With a powerful army he passed the Pyrenees, penetrated into Navarre, took Pamplona, the capital, and leveled the walls of the city with the ground. Clearly this was not part of his programme as the champion of the Christian religion in Spain; for Pamplona was the capital of a Christian state, and it is even asserted that prior to 870 A.D. Moors had not been admitted within its walls. Pressing onward, Charlemagne subdued a great part of the country between the Pyrenees and the Ebro: but on his return northward, while threading the defiles of the mountains near Roncesvalles, his rear-guard was furiously assailed and annihilated by a mixed force, of which a body of Navarrese, enraged at the destruction of their capital, formed an important section. Eginhard, the secretary of the emperor, tells us that the whole rear-guard, including many generals and chief nobles, was totally destroyed, and that the spoil of the campaign, together with the whole baggage of the army, fell into the hands of the victors. In this action fell Roland (q.v.) the famous paladin, and the hero of a hundred romances. The older poets found abundant material in the battle of Roncesvalles, in which, on the one side, ranked the most distinguished chivalry of that time, and on the other the patriotic, high-spirited mountaineers of Navarre; and in recent times the incident has contributed a spirited allusion to sir Walter Scott's *Marmion:*

> "Oh, for a blast of that dread horn,
> On Fontarabian echoes borne,
> That to King Charles did come,
> When Roland brave, and Olivier,
> And every paladin and peer,
> On Roncesvalles died!"

RONCIGLIO'NE, a city of central Italy, in the province of Rome, and 12 m. s.s.e. of the city of Viterbo. Pop. 6,084. It has a fine cathedral, a Gothic castle, and several fine old palaces. Hats, cloth, and cotton goods are manufactured, and iron, brass, and copper works are in operation. In the neighborhood of the city there are sepulchral vaults, hollowed out in the porous rock (*tufo*), and several sulphureous springs.

RONDA, a picturesque Moorish t. of Spain, in the modern province of Malaga, on the Guadiaro, 50 m. n.n.e of Gibraltar. Situated at a considerable elevation, the climate of Ronda is unusually salubrious, and the town is a favorite summer retreat for the wealthy of Seville, Ecija, and Malaga. The great annual fair takes place in May, at which time Ronda, its bulls, and bravoes are seen to the greatest advantage. On such occasions the small but active horses of the town are sold in large numbers to officers from Gibraltar; and leather, saddlery, embroidered gaiters, garters, and mantas are also sold. Pop. 23,500.

RONDELET, WILLIAM, a French naturalist, b. at Montpellier, in 1507; died 1566. He became a medical practitioner in Montpellier, and professor in the medical school there. He was a zealous student of natural history, and particularly distinguished himself in ichthyology. His *Histoire entière des Poissons* (Lyons, 1558) was one of the first works which contributed much to the progress of that branch of science.

RONDO (Ital.), or RONDEAU (Fr.), originally a little poem of 13 lines, divided into three unequal strophes; the two or three first words of the first line serve as the burden, and recur after the 8th and 13th line. Thence, in music, the term has come to denote a light air, consisting of three or more strains, the first terminating in the original key, and each of the others so constructed as to conduct the ear back to a repetition of the first strain. In a more general sense, the name rondo is also often applied to any light lively tune which ends with the first strain repeated.

RONDOUT, N. Y. See KINGSTON, N. Y.

RONGE, JOHANN. See GERMAN CATHOLICS.

RONSARD, PIERRE DE, a celebrated French poet and reformer of French poetry, was born at the château de la Poisonnière, in Vendômois, Sept. 11, 1524. At the age of nine he was sent to the collége de Navarre, but was soon removed, and shortly after entered the service of the dauphin as page. Handsome, well-made, and excelling in all bodily accomplishments, he soon became a general favorite. When his master died (1536), he became attached to the household of the duc d'Orléans, second son of the king, accompanied James V. of Scotland back to his kingdom, with his new bride, Marie de Lorraine, in 1538; and after a stay of nearly three years at the Scottish, and six months at the English court, he returned to France, and re-entered the service of the duke. A little later, however, on recovering from a serious illness, he found himself afflicted with a deafness, which led him to resign the pursuits of arms for those of letters. With this view, he took up his residence in the collége de Coqueret and studied hard for five years. He had previously acquired a knowledge of Latin and of several European languages. His own language, as a vehicle of literary instruction, was a subject of continual meditation with him. Familiar now with the masterpieces of Greece and Rome, he wished (like a true child of the renaissance, as he was) to invest the national poetry with a classic dignity and grace. Several of his fellow-students shared his opinions and enthusiasm; and in 1549, one of these, Joachim du Bellay, published what may be called the first manifesto of the new school, the *Illustration de la Langue Françoise.* Without denying the necessity or the value of the change thus begun by Ronsard and his friends, we may just remark in passing that the most intelligent French critics now admit that it was too radical, too absolute; it broke abruptly with the national traditions and tendencies, and more than anything else helped to fix that pseudo-classicism of style which was subsequently brought to disastrous perfection in the *splendid acilia* of Corneille and Racine. In 1550 Ronsard himself appeared in the field with his *Amours* and *Quatre Livres d'Odes.* The volume excited the most violent opposition among the adherents of the older national school, and it cannot be said that their antipathy was altogether unreasonable. Rabelais (q.v.) was conspicuous among the adversaries of the new school, and made Ronsard the subject of some bitter sarcasms. But on the whole, the classic party had the best of it. Its efforts were in harmony with the general intellectual tendencies of the time, and, besides, Ronsard was just the man to make powerful friends. Marguerite, sister of Henry II., granted him a pension; the illustrious chancellor de l'Hôpital warmly encouraged him to persevere in his course; and both Henry II. and François II. covered him with honors and pensions. In 1553 a new edition of the *Amours* was published; in 1555 the first, in 1556 the second, volume of his *Hymnes;* and finally, in 1560, an edition of his whole works up to this period, in four volumes. The admiration of his contemporaries intoxicated him; and he did not shrink from conferring on himself a sort of anticipatory apotheosis. During the religious wars that devastated France, Ronsard made himself noted by the violence of his attacks on the Calvanists or Huguenots. Twenty days after the massacre of St. Bartholomew he published *La Franciade*, an epic fragment. He meant that it should comprise 24 books, but he only finished 4, having, perhaps, discovered that the subject was not happily chosen, and that epic poetry was a touch above him; yet such was the belief in his genius, that not a few of his contemporaries did not hesitate to prefer it to the *Æneid*. Charles IX. could only express *his* delight by conferring on the lucky bard additional favors. He gave Ronsard the abbeys of Croix-Val and Bellozané, and the priories of Saint-Cosme, of Evailles, etc. But the "disorders" of what his countrymen called his "joyous" youth now began to tell upon him, and, afflicted with premature infirmities, he retired to the abbey of Croix-Val, where he spent most of his remaining years in lettered ease, honored with the attentions of the great to the last. Queen Elizabeth of England sent him a set of diamonds, and Mary Stuart, from her prison, a set of plate worth 2,000 crowns, with the inscription:

À Ronsard, l'Apollon de la Source des Muses.

In 1584 he collected and republished his whole works in one volume, and died on Dec. 27 of the year following.—See Saint-Beuve's *Œuvres Choisies de P. Ronsard, avec Notice, Notes et Commentaires* (Paris, 1828).

ROOD, a measure of surface, the fourth part of an acre, and containing 40 square poles or perches. It is quite different from the rood used in estimating mason-work, for which see ROD.

ROOD (Anglo-Sax. *rod*, a cross), a figure of the cross, and generally of the crucifix. The word is also applied to the actual cross on which our Lord suffered, although, when used to signify the relics of the true cross, it is commonly found with the prefix Holy, from which Holyrood at Edinburgh derives its name; but in most ordinary signification it is applied to the large and striking crucifix which was placed at the entrance of the chancel in most mediæval churches. On either side of the cross most commonly were placed figures of the blessed virgin and St. John, in allusion to John xix. 26. The manner of placing the rood differed in different churches; most commonly it stood upon a gallery or screen at the entrance of the chancel, which was called the ROOD-LOFT or rood-screen. In England, after the reformation, the rood of course was, as a rule, removed from all churches; but in a few country churches it still remains in a more or less perfect form. A very perfect foreign example of the rood is in the great church of Louvain.

ROOF. The coverings of houses vary in every climate and every age. In warm countries, such as India, flat roofs, covered with cement, are almost invariably used. The frequent allusions in the Bible to the house-top show that the roofs of Palestine were flat in ancient times as they are now. Those of Egypt and Assyria (q.v.) were also flat, and were composed of wooden beams, covered with thick layers of earth, forming an impenetrable protection from the fierce heat of the sun. In countries where the climate is milder, and rain more abundant, roofs sloping from a central ridge are the usual form. The Greeks and Romans constructed their roofs in this way. Those of Greece were, in important works, covered with marble slabs, carefully grooved together. so as most effectually to protect the interior from rain. In the common buildings of Greece and Rome, roofing-tiles are used.

In the rainy climate north of the Alps, roofs of a much steeper pitch are employed, so as the more readily to throw off rain and snow. The angle at the ridge is not uncommonly a right angle; and roofs slated in the usual way should never be less than ⅓ of the span (or width between supports) in height. When large slates are used, ¼ of the span in height will suffice.

When roofs are well constructed, they serve to bind the walls together, and thus to strengthen the building. In order to do this effectually, they must not be made of too great weight, otherwise they crush the walls. The actual covering of the roof and its supports are therefore made as light as possible, and the strength concentrated in principals or trusses. The following are the commonest forms of these trusses: Fig. 1 represents what is called a king-post roof (A being the king-post), and fig. 2 a queen-post roof (B, B being the queen-posts). The latter is used for wider spans than the former, and has the advantage of leaving the center of the roof clear of timbers, so that attic rooms may be introduced. The other members of the truss are named as folows: C,C,C,C, braces or struts; D,D, tie-beams; E,E,E,E, principal rafters; F,F, ridge-pieces; G,G, etc., purlins; these and the ridge-piece are laid across from truss to truss, and carry the common rafters J,J. H is a collar. K,K, the pole-plates, and L,L, the wall-plates, are laid along at the wall-head, to bind the wall and feet of rafters together.

The above system of construction has been used from a very early time to the present day. The early Christian, and probably the Roman basilicas, had exactly such roofs. In early Gothic times roofs of this kind were made ornamental by carving the king-post and molding the tie-beam. During the decorated style, an arch, or a series of cants was introduced. As the style progressed, curved braces were placed under the tie-beam to support it; these were carved, and rested on elegant corbels, the spandrels between the braces and the wall being filled with tracery. In the perpendicular style, the central part of the tie-beam is cut away, and the beautiful hammer-beam (q.v.) roofs of the period become usual. The roof of Westminster hall is one of the finest examples of this kind of roof. These open timber-roofs are used both in churches and halls, but chiefly in the latter, as the church roofs were frequently vaulted. See VAULT. In modern times, when great spans have to be roofed over, combinations similar to those used in lattice bridges (q.v.) are required. Recently iron has been introduced, and by means of it, spaces of almost any width can be roofed over.

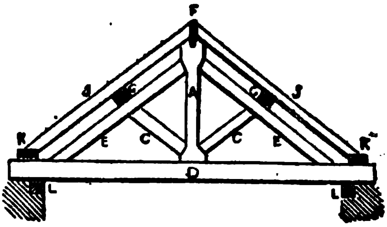

FIG. 1.

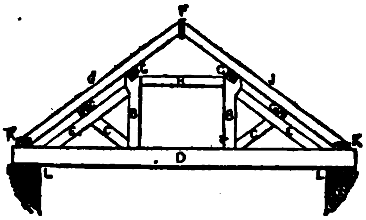

FIG. 2.

ROOK, *Corvus frugilegus*, a species of crow (q.v.), very common in the southern parts of Britain, and found in many parts of Europe and Asia, even to Japan; about the same size with the common or carrion crow, but easily distinguished from it, even at a distance, by its color, which is a glossy, deep-blue black, in certain aspects grayish. On a nearer view, a more notable distinction is found in the naked warty skin at the base of the bill, extending back rather beyond the eyes, and pretty far down on the throat. Still more different are the habits of the birds, the common crow frequenting lonely situations, and preying much on carrion; the rook choosing rather the neighborhood of human habitations, and seeking its food, both animal and vegetable, chiefly in cultivated fields. Moreover, whilst the common crow is solitary, the rook is gregarious; and very large companies often assemble in *rookeries*, making their nests in close proximity, generally in tall trees, the same tree often sustaining many nests. So far are they from disliking the companionship of man, that it is not uncommon for rooks to build their nests in the trees which grow in the midst of great cities. A tree even in Cheapside has been occupied by rooks' nests. Few cities or large towns in Britain are without rookeries, sometimes of considerable magnitude. The smoke seems to be disregarded by the birds. The rook is nowhere more abundant than in England and the s. of Scotland, but it becomes rare in the northern parts of Scotland, and is not to be seen in Orkney and Shetland; probably, however, not on account of climate, but from want of trees. Sometimes, indeed, rooks have been known to make their nests in steeples, vanes, etc., but rarely. They have been observed to avoid with peculiar caution trees which are decaying and likely soon to be blown over—perhaps, however, on account of the state of their twigs—and trees that are marked on the trunk for cutting down. They are notable for the care with which they guard against the approach of danger when they are feeding in fields, a few solitary rooks perched on trees, palings, or the like, being ready to give the *caw* of alarm to the often very numerous flock. They are also notable for their dread of a gun, the danger of which they seem to know; so that a man without a gun may approach them much more nearly than a man who carries a gun, and even a stick lifted up is apt to excite their alarm. It is also commonly believed in some districts that they know Sunday, and are less timid of the approach of man on that day than on other days of the week. A gig or carriage may approach them much more nearly than a man on foot, and they are very indifferent about the passage of a railway train. It is interesting also to observe how soon they become familiarly acquainted with scarecrows. The nests of rook are formed of twigs, lined with grass and fibrous roots; generally containing four or five eggs, of a pale greenish color, blotched with dark greenish-brown. During the nest-making time, rooks rob each other in a remarkable manner, and prodigious quarrels arise in rookeries on this account. Any pair attempting to found a separate colony on a tree far apart, are apt to be assailed by the whole force of the rookery, and the nest pulled to pieces, its materials of course being carried off.

Rookeries are sometimes of great size, and immense flocks of rooks are often to be seen feeding together in fields, or darkening the sky in their outward or homeward flight. Farmers very often complain of them for rooting up grass and young corn, and for injury to young potatoes, turnips, etc.; but on the other hand, it is urged that they are of very great use by eating up wire-worms, cock-chafer grubs, and other insect larvæ, slugs, etc., and that the grass pulled by them is very often that of which larvæ have already devoured the roots. The truth appears to be that rooks in moderate numbers are very useful; but that it is possible to protect them too much, until their multitudes become a nuisance in a neighborhood, the insufficient quantity of their favorite food compelling them to other resources not so agreeable to the farmer; and at least in such circumstances they certainly devour large quantities of grain.

It has been supposed that the naked space at the base of the bill of the rook is in consequence of its habit of digging in the ground, and in support of this view it is urged that this space is feathered in the young bird; but it is found to become naked even in rooks caged from the beginning of their life, and there are numerous other arguments against the supposition. The naked space must be regarded as a natural peculiarity of the species.

The same rooks seem to take possession of their old nests year after year, repairing them, and not building new ones. The time of building and repairing nests is one of prodigious clamor in the rookery, and begins early in spring. The male rook feeds the female assiduously during incubation, and sometimes takes her place on the nest. Both parents bring food to their young ones.

The rook is capable of being tamed, and tame rooks have been known to exhibit something of the imitative power of voice possessed by several other birds of the same family.

White, cream-colored, and pied rooks are now and then seen. These peculiarities of plumage probably arise from a more or less diseased condition.

ROOKERIES, in law. Though rooks are often encouraged to breed in and to frequent the trees of an estate, yet they are not protected in any way by laws resembling the game laws, which inflict penalties for illegally trespassing to take or kill them. The rooks, while frequenting the rookery, whether it is an ancient or a newly-made rookery, are in the ordinary category of wild animals, and the owner of the estate or ground where the trees grow has no more property in them than any other person. The owner of a rookery once brought an action against a neighbor for shooting at the rooks as they were flying over the neighbor's estate toward the rookery; but the English courts held that no such action was maintainable, for every person may shoot and catch a wild animal upon his own lands, if he pleases. The law is the same in Ireland and Scotland. No person can be given into custody, or fined, or punished by justices of the peace for trespassing in order to shoot at rooks; nevertheless, the owner or occupier of the ground trespassed upon may bring an action of damages against the trespasser.

ROOKE, Sir GEORGE, a distinguished British admiral, was b. in the year 1650 near Canterbury, at the country-seat of his father, sir William Rooke. Having entered the navy, he found himself, at the age of 30, a post-capt.; and in 1689 he was promoted to the rank of rear-admiral. He was engaged in the action off Beachy Head between the earl of Torrington and the French admiral De Tourville; and in 1692 he took part in the memorable battle of La Hogue, fought between the French fleet and the combined English and Dutch force under admiral Russell. On this occasion his services were of the most brilliant and dashing character, and in acknowledgment of them he received the rank of vice-admiral of the red, the honor of knighthood, and a pension of £1000 a year. His next important service was the destruction of a Spanish plate-fleet in the port of Vigo; and in July, 1704, in conjunction with sir Cloudesley Shovel, he accomplished the capture of Gibraltar. Such was the vigor of the operations, that a single week sufficed for the reduction of a fortress which, as having defied the most formidable, elaborate, and prolonged attack, has since been reputed impregnable. On Aug. 9 of the same year, he engaged off Malaga a French fleet of much superior force, under the comte de Toulouse, and fought one of the bloodiest of our naval battles, the honors of which fairly remained with the English, though the escape of the enemy's force rendered it by comparison a barren triumph. The struggle lasted through nearly a whole day; the French loss was upward of 3,000, the English upward of 2,000 men. On the return of sir George to England, he was received with marked distinction by queen Anne; but finding the hostility of the government directed against him on the merely partisan ground of his having previously, as member for Portsmouth, allied himself with the opposition, he resigned his employments, and along with them his seat in parliament; and till his death, which took place on Jan. 24, 1709, led the life of a quiet country gentleman on the family property in Kent. He was thrice married, and left behind him one son by his second wife.

ROOKS, a new co. in n.w. Kansas, crossed by the s. fork of Solomon river; 900 sq.m.; pop. '80, 8,113. The surface is undulating and mostly prairie. Co. seat, Stockton.

ROOMELIA. See ROUMELIA, *ante*

ROON, ALBRECHT THEODOR EMIL, Count von, b. Germany, 1803; educated in Berlin; in 1819 was made second lieut., and in 1828 was appointed teacher in the military academy; and in 1832 was ordered to the headquarters of the Prussian corps of observation on the Rhine. In 1833–34 he was employed in the topographical bureau, and in 1835 was relegated to the grand general staff. After various promotions he was made commander-in-chief of the 20th brigade of infantry in 1856, commander-in-chief of the 14th division in Düsseldorf in 1858, and six months later became lieut.gen. In 1857 he became minister of war, and in 1861 minister also of marine, holding that office for 10 years. On the resignation of prince Bismarck, Dec. 21, 1872, he was made president of the cabinet, and soon afterward field-marshal. He resigned Nov. 9, 1873, as Bismarck found it necessary to combine his position as imperial chancellor with that of president of the cabinet. He received the cross of the black eagle from the king after the war of 1866 for his services in organizing the army, and won considerable distinction during the Franco-German war.

ROOP, a co. in extreme n.w. Nevada, adjoining California and Oregon, pop. '80. 286—254 of American birth. The surface is mountainous, and traversed by the Granite range. There is much beautiful scenery; Pyramid lake, about 30 m. long, is visited by many tourists. Timber and water are scarce. Gold and silver exist.

ROOSEVELT, Robert B., b. N. Y.' 1829; educated as a lawyer, and practiced at the bar of New York for 20 years. In 1868 he was appointed commissioner of fisheries for the state of New York, a position which he still holds; much of his life having been devoted with enthusiasm to pisciculture, and American fishery interests. He edited the New York *Citizen* from 1868; was elected to the 42d congress as a democrat, and served 1871-73. He has published *Game Fish of the North; Superior Fishing; Game Birds of the North; Five Acres Too Much*, etc.

ROOT, in botany, sometimes designated the *descending axis* of a plant, that part by which it is fixed to the soil and derives nourishment from the soil. The root is developed in the germination of the seed, at or about the same time with the stem, and forces its way downward as the stem grows upward. The root differs from the stem in the irregularity of its ramifications, in the want of a central pith, in the want of buds, in the want of scales or of scars to indicate their former presence, and in the want of stomata. The axis of the root giving off branches, these finally subdivide into *fibrils*, which are little bundles of annular ducts, or sometimes of spiral vessels incased in woody fiber, and covered with a lax cellular integument. The apex of each fibril is sometimes called the *spongiole:* it consists of extremely lax cellular tissue, and has the property of absorbing fluids with great rapidity, thus subserving the nourishment of the plant. See Endosmose.—Aerial roots occur in some plants, as in some *epiphytes*, the banyan, mangroves, etc.; by which nourishment is derived from the air, in addition to that obtained through the leaves and bark, or by which the branches seek to connect themselves anew with the ground for support and nourishment; and many plants, as willows, produce adventitious roots very readily, when any portion of the stem or branch is imbedded in moist soil, of which advantage is taken for their artificial propagation.—The central axis of many roots goes deep into the ground in a tapering manner, forming what is called a *tap-root;* other roots have the descending axis very short, and are called *fibrous*. The roots of some plants spread very widely; those of others occupy a very limited space. Roots of coniferous trees and palms are very small when compared with the appearance of the tree above ground.—Tap roots sometimes assume a conical form, as in the carrot; others are variously developed in thickness at the upper part, as in the turnip and radish. Tubers (q.v.), bulbs (q.v.), and corms (q.v.) are peculiar developments, evidently intended to secure a store of nourishment for the plant, but which also are very frequently available for the use of man.—Esculent roots are numerous, and many roots also contain secretions either peculiar to themselves, or more abundant than in the other parts of the plant, and become therefore useful in medicine or in the arts, while some are very poisonous. The roots used for food, besides the tubers, bulbs, and corms above mentioned, are generally those which are thick and fleshy. The plants to which they belong are of very different genera and orders—some of the natural order *cruciferæ*, as the turnip and others of the genus *brassica*—some of the order *chenopodiaceæ*, as beet and mangold wurzel—some of the order *umbelliferæ*, as the carrot, parsnip, etc.—some of the order *leguminosæ*, as the *pachyrhizos angulatus*, which is cultivated in all parts of the East Indies, and *P. trilobus*, which is cultivated in Cochin China. In many of the lower classes of plants, particularly the algæ, there is no root whatever, although the plant is often attached by a base.

ROOT, in philology, is that part which is common to a group of allied words—the germ out of which they have all sprung. It is arrived at by taking away the formative parts—the suffixes and affixes, and reversing any change that their presence may have caused. Thus, in co-in-*cid*-ence, the root syllable is *cid*, the primary form of which in Lat. is *cad*, to fall. It is seldom that this analysis can be successfully performed with only one language; in order to get at the true root, the corresponding words in all the languages of the same family must be compared. Thus, in the Eng. words *story, history, historical, historically, histor* would seem to be the root; but by comparing the Greek with the Lat. and Sanskrit, we arrive at a syllable *vid*, meaning to see or know, of which the Eng. (to) *wit* (wist) is only another form. And even then we are not sure that we have arrived at the original and most simple form. Thus, Eng. *yoke*, Lat. *jugum*, come from the syllable *jug*, to join, seen in Lat. *ju(n)go*, Gr. *zeugo;* and this might be rested in as the root, were there not a simpler form, *ju*, preserved in Sans., and having the meaning of mingling or being together; this, which may be taken as the primary root, gives rise to the two secondary roots or modifications, *jug*, to join, and *yudh*, to fight (i.e., to join battle).

The roots of the Aryan languages are always monosyllabic, as *i*, to go; *ga*, to go; *ad*, to eat; *vak*, to speak; *star*, to strew. They are divisible into two classes, the one expressing some action or general property, as in the instances now given; the other indicating relative position, as *ma*, here or me; *ta*, there or that. The one class are called *predicative* roots; the other *pronominal* (see PRONOUN, PREPOSITION). They all expressed primarily some physical notion or relation palpable to the senses; but from these the transition to the impalpable conceptions of the mind is natural and obvious; thus, *vid*, to see, served also for to know. The notion expressed by a root-word is always of a very general kind; but by a variety of expedients, such as lengthening the vowel, reduplication of the syllable, prefixing and affixing letters and syllables (many of which at least are evidently pronominal roots), and composition with other predicative roots, one germ gives rise to a whole group of words expressive of the specific applications of the generic idea. Thus, from the root *spac* or *spec* (in Gr. *skep*), to look, have sprung a numerous family of words in the English and other kindred tongues: *spy*, *despise* (to look down upon), *spite* (through Fr. *despit*), *respite*, *respectable*, *suspicion*, *prospect*, *inspect*, *auspices*, *speculum*, *species* (i.e., the appearance or individual form, as opposed to the kind or genus), *spices*, etc.

Roots, in the Aryan languages, never enter into speech in their pure and simple form; to make them words, they almost always take on the addition of a pronominal element. Thus, the reduplicate root *da-da*, having the sense of giving, becomes, by the addition of *mi*, my, the word *da-dâ-mi*, I give; *vak*, to speak, by affixing *s* (for *sa*, that), becomes *vaks*, in Lat. *vox* (*voks*), voice (i.e., that speaking). See INFLECTION.

It requires but a few germs to produce, by the processes above described, the most copious vocabulary. The 50,000 words of the Chinese dictionary are formed from 450 roots; those of Hebrew and of Sanskrit are reckoned at about 500; and there are probably not many more in English (see Max Müller's *Lectures*, 1st series, p. 252). The theories as to the origin of the roots themselves, and why a particular thing or notion should have become associated with a particular sound more than with any other, are noticed under PHILOLOGY and ONOMATOPŒIA.

ROOT, in algebra, denotes any value of the unknown quantity in an equation, which will render both sides of it identical. See EQUATION, INDETERMINATE PROBLEMS, IRREDUCIBLE CASE, etc. The determination of the roots of equations, either formally or actually, constitutes the greater portion of the science of algebra, while the approximation to roots of those equations whose degree is still beyond a general solution (4th and upward) forms almost a separate branch of itself. Roots are divided into various classes; they are *real* when they consist of numerical quantities positive or negative; and *imaginary* when they assume the form $a + b\sqrt{-1}$.

ROOT-MILDEW, a name given, not to any well-determined species of fungus, but to certain *mycelia*, which infest the roots of peaches, apples, roses, currants, etc., and cause their death. The tree or shrub is often very suddenly cut down, from apparently perfect health. The roots are found more or less decayed, and covered with filmy white threads. The *mycelium* is supposed to belong to species of *polyporus*. In some plants, as roses, the state of the bark just above the soil is believed to be premonitory of the disease, which may perhaps then be arrested by washing with a solution of corrosive sublimate. But the mycelium is not easily destroyed, and a tree of the same kind should not be planted where it has proved fatal.

ROOT-PARASITES, plants which grow upon, and derive their nourishment from, the roots of other plants. Such are the broom-rapes (*orobancheæ*, (q.v.), species of *thesium*, etc., and the *rafflesias* (q.v.), with other *rhizantheæ* (q.v.).

ROOT-STOCK, or RHIZOME (*rhizoma*), in botany, a stem running along the surface of the ground, partially covered with soil; sending out roots from its lower side, and leaf-buds from its upper. The common yellow iris affords a very perfect example of it. Many ferns have root-stocks. The root-stock is often regarded as a creeping root; it is really, however, not a root, but a stem.

ROOT, GEORGE FREDERICK, b. Mass., 1820; partner with A. N. Johnson as teacher of music, and organist 1838-48; taught music in New York 1844-45; in 1860 became a member of the Chicago music firm of Root & Cady. He has composed many popular songs, and edited numerous books of sacred music, which have been widely used.

ROPE AND ROPE-MAKING. Ropes are usually made of vegetable fibers, and differ only from twine in their much greater thickness. The fiber most commonly used in Britain is hemp; but large quantities of plantain fiber, called manilla hemp, made from the leaf-stalks of *musa textilis*, are also employed, especially for the large ropes used for various purposes on board ships. Ropes consist of many thicknesses of yarn, which is spun by hand in places called rope-walks. The spinner has a large bundle of the fiber loosely gathered round his waist, from which he pulls out a few fibers, and attaches them to a hook in the turning-weel or whirl, which is stationary, and is worked by an assistant. Experience teaches him what number of fibers to draw out, and how to twist them so as to hold firmly on to the hook. He then walks slowly backward down the rope-ground, gradually drawing out or regulating the pulling out of the fibers so as to make an equal yarn, which receives the necessary twist from the whirl. When he has got to the end of the walk, another spinner takes the yarn from the hook of the whirl, and fixes it to a reel, which is then set in motion; and he attaches a second portion of hemp from his own supply to the hook, and proceeds down the walk as the previous one had done. In the mean time, the first spinner gradually walks up the ground, carefully guiding his length of yarn as it is wound on the reel. When he reaches the reel, it stops, and he waits until the second spinner's length is completed. He then in his turn takes it off the hook, and twists it on to his own; and the reel being again started, receives the additional length from the second man, and so on until the full length required is made up. The next operation is called *warping*, and consists in stretching out the number of yarns required for a rope. These are all slightly twisted again separately, and stretched to an equal length. Then, if they are intended for tarred ropes, each yarn is drawn separately, either lengthwise or in a hank, through a kettle of hot tar. The superfluous tar is removed by drawing it through a hole lined with oakum. In the next process, called *laying*, two or more yarns are attached to hooks on a whirl, so that when it is turned they will be twisted together the contrary way of the original twist they received in the first spinning. When this is done it is called a strand. Then as many of these strands as are required for the rope are stretched at full length, and are attached at each end to whirls. One of the whirls has but one hook, to which all the strands are attached; the other has as many hooks as there are strands, one always being central, and a strand is attached to each. The whirls are then put in motion, but in opposite directions, and this causes the outer strands to be laid with great regularity and firmness around the central one. Such is the ordinary process of rope-making; but machines have been invented which produce ropes with such mathematical precision that the strength of the rope may be calculated with great exactness. Captain Huddart has the merit of effecting these improvements; and very few applications of mechanism are more beautiful in their details than those which he has worked out. They, however, do not alter the principle of the manufacture. Within the last few years a great improvement has been patented by Mr. Edward Sang of Edinburgh, and is now in profitable use in the large establishment of the Edinburgh and Leith Ropery company. It consists of a machine which spins the yarn from material supplied as before by hand, but it does away with the long walk, and can be used in a small room.

Large ropes are either what is called *cable-laid* or *hawser-laid*. The former consist of three large strands, each made up of three smaller strands. A cable-laid rope of eight inches' circumference is made up in this way of nine strands, each containing 37 original yarns, or altogether 333 yarns. A hawser-laid rope consists of only three strands, each containing a sufficient number of yarns to make up the required thickness. The numerous lives and the vast property depending on the efficiency of ropes employed in shipping have caused a great amount of ingenuity and care to be brought to bear on the manufacture. One very great improvement of modern times has been the introduction of wire ropes, which are now extensively used in rigging ships, and for other purposes. They are generally made of iron wire, sometimes but not always galvanized. The twisting is effected in the same way as that in which the strands of a hempen rope are laid together.

ROQUE, Saint, a popular saint of the Roman Catholic church in France, who is especially considered the patron of those sick of the plague. Of his history, nevertheless, few particulars have been preserved. He was born of a noble family in Montpelier, early in the 14th, or at the end of the 13th c.; and having undertaken a pilgrimage to Rome, was surprised, upon his way through Italy, by an outbreak of the plague at Piacenza, where he devoted himself with generous zeal to the care of the victims of this pestilence. Falling sick of the plague himself, and abandoned by man, he contrived to drag himself to a neighboring wood, where a dog used to lick his sores; and it pleased God to restore him to health. He returned to France; and, after a life of great sanctity, died at Montpelier, probably in 1327.

ROQUEPLAN, Joseph Étienne Camille, 1802–55; a French painter who commenced to exhibit in the French salon in 1822, and whose charming style at once fixed his high rank. In 1827 the "Marée d'Equinoxe," afterward engraved by Gelée, and illustrations of Walter Scott's works, gave him an English reputation. The "Amateur Antiquary," painted in 1834, sold in 1858 for 30,000 francs. Theophile Gautier ranks him as one of the most admirable of all French painters, of a school of exquisite finish and truth to nature, much followed since his time. His latest work was "Filles d'Eve."

ROREE, Rori, or Lohri, a decayed t. of Sinde, stands on a picturesque rocky eminence, on the e. bank of the Indus, in lat 27° 38′ north. Steamers ply to and from Hyderabad. Cotton and silk fabrics, gold and silver wares, paper, and leather are manufactured. Pop. '72, 8,580.

RORIC FIGURES, images produced by breathing on glass or other polished surfaces which have been covered by some object. Dr. J. W. Draper, in 1840, called attention to the subject in the *Philosophical Magazine*. Möser of Königsberg, in 1842, made a communication to the French academy through M. Regnault, in which he stated that, when two bodies are very near each other, they receive impressions of each other's images, or, if a smooth surface has been touched by another body, it acquires the property of precipitating vapors, which, by their action, cause an impression which gives to the surface a different appearance. These roric figures are often called by the Germans *hauchfiguren*, or breath figures. Mr. Grove has called them molecular impressions. Mr. Hunt has produced similar effects by heat. He placed gold, silver, and bronze coins and medals on a polished heated copper-plate. After cooling he removed the coins, etc., and exposed the plate to the vapor of mercury. The parts which had been covered by gold and silver coins gave the most distinct impressions, the gold more than the silver. Bregnet, a French watchmaker, found markings on the exterior of the inner case of a watch reproduced inversely on the inner surface of the outer case. Phenomena of this kind have been observed by thousands, but the explanations vary, as probably do the causes; there sometimes being a transfer of matter from one body to the other, and sometimes a molecular change in the surface in consequence of its having been for some time exposed to different external circumstances. There is always a molecular change taking place on the surfaces of all bodies; the very constitution of matter necessitates it. The molecules of all matter are in a constant state of vibration: often there is a loss of substance in consequence of such vibration; but when there is no loss there is necessarily some change in the surface, and this change will vary with the material by which the surface is covered. A gold coin will exert a different impression from a silver one, or from a steel, iron, or bronze object; and a woolen or silk fabric will produce a still different effect. The surfaces of all these objects are constantly throwing off, it may be infinitesimal, particles of matter, and the mutual action between two surfaces must vary with the relative properties of those surfaces. The surface of a piece of polished steel or silver will change more rapidly in a heated than in a cool room, other circumstances being the same; and also faster in a light than in a dark room. The kinematic energy of the surface, and therefore its change, will vary with circumstances.

ROR'QUAL, *Rorqualus*, *Balænoptera*, or *Physalus*, a genus of cetacea of the same family (*balænidæ*) to which the Greenland whale belongs, and distinguished by having a dorsal fin, which, however, is not large in comparison with the size of the animal, and is pointed, the point directed backward; and also by the form of the head, which, instead of having the upper jaw much arched, as in the Greenland whale, has it in the skeleton nearly straight, the plates of baleen or whalebone being, therefore, much shorter, while along the throat and belly are many longitudinal folds, allowing of the distention of the integuments so as to form a great pouch for the reception of water and prey, to be afterward sifted by the plates of baleen. For a long time these folds of the throat and belly were a puzzle to naturalists, but their use seems now to be thoroughly ascertained. The form is more elongated than in the Greenland whale, and as the girth of the largest rorquals has been found equal to that of the largest Greenland whales, the rorquals appear to be the largest of the cetacea, and indeed of all animals at present existing in the world. The northern rorqual sometimes rather exceeds 100 ft. in length. Concerning the species of this genus, there is great doubt and uncertainty. Some naturalists confidently assert the existence of several species in the northern seas, and a genus, *rorqualus* or *physalus*, has been constituted distinct from *balænoptera*, the largest species being referred to the former; and a smaller one, said not to exceed 25 ft. in length, and known as the *pike whale*, from the resemblance of the mouth to that of a pike, being assigned to the latter. Other naturalists of no mean reputation doubt if the pike whale (*balænoptera rostrata* or *B. musculus*) is anything else than the young of the great northern rorqual (*R. boops*), the *fin-fish* or *razor-back* of whalers. The question was supposed to have been determined by Mr. F. Knox of Edinburgh, who found the number of vertebræ to be different in specimens cast upon the Scottish shores; but the number of vertebræ has been found so different in other specimens examined that either this must be a comparatively unimportant character, or the number of species must be greater than has been supposed. The northern rorqual is of a slate-gray color, whitish beneath. It is found in the arctic seas, visiting also those of the northern temperate regions, and is not very unfrequent on the coasts of Britain. When it comes to the surface of the water to blow, it does not lie motionless, as the Greenland whale usually does, but swims at the rate of about five miles an hour, and in blowing, it makes a prodigious noise. Its speed, when harpooned, is very great. Scoresby mentions an instance of one carrying out 8,000 ft. of line in a minute. It is not easily captured; and whalers dislike it, because the Greenland whale is seldom found near it, while its own value is very inferior, owing to the comparative thinness of the blubber, and the shortness and inferior quality of the whalebone. It is, however, an important object of pursuit to the Laplanders and Greenlanders, who wear it out by assailing it with weapon after weapon, and finally divide the spoil. A large rorqual yields 4,000 gallons of oil.—The rorqual does not feed so exclusively on small prey—acalephæ, mollusks, etc.—as the Greenland whale. Its gullet is much wider, and it preys much on fishes, the shoals of which it follows into bays and estuaries, devouring them in multitudes. The stomach of a rorqual has been found to contain 600 large cod, and a great quantity of pilchards. One which frequented the firth of Forth for 20 years was well known to the fishermen there, and much detested by them. It was at last stranded at Abercorn in 1692. It was 78 ft. long.—In the southern seas, another species of rorqual is found (*R.*, *B.*, or *P. Australis*), which has a long dorsal fin, placed further forward than in the northern rorqual. It attains a large size. The South sea whalers do not care to pursue it. Its range seems to extend to the northern hemisphere in the Pacific.

ROSA, EUPHROSYNE PAREPA, 1836–74; b. Edinburgh; daughter of Georgiades de Boyescu, a Wallachian nobleman, and Elizabeth Seguin. She studied under Crescentini, Panseron, and Bordogni, and made her first appearance as a singer at Malta under the name of Parepa. She made her *début* in London in 1857, and in 1863 married capt. Carvell, who died two years later. She then came to America and appeared at Irving hall, New York, in 1865. In 1867 she married Carl Rosa, the violinist, with whom in 1869 she organized an English opera company, which performed in all the larger cities of the United States. She sang at the Boston peace jubilee in 1869, and was a member of the Italian opera company at the Khedive's theater in Cairo during the winter of 1872–73.

ROSA, SAINT, 1586–1617; b. Lima, Peru; the only American saint in the calendar of the Roman Catholic church. Her parents were originally wealthy; but, having lost their property, were supported by the toil of their daughter, who became a Dominican recluse. The canonization of St. Rosa was in 1671 by Clement X.

ROSA, SALVATOR, was b. at Renella, in the neighborhood of Naples, in 1615. His first instructor was Francesco Francaziani, who had married his sister. Some of his landscapes attracted the notice of Lanfranco, who, purchasing them, enabled and encouraged the young artist to pursue his studies. He became a pupil of Aniello Falcone, a painter of battle-pieces, and afterward of Spagnoletto. Having gone to Rome he was employed to paint an altar-piece and some other works by the Neapolitan cardinal Brancacci, and he accompanied prince Carlo de' Medici to Florence, and executed several important works for him. He finally settled in Rome in 1638, and died there, Mar. 15, 1673. Salvator has a great reputation as a painter, and he owes this mainly to his landscapes, which, though faulty in many respects, arrest attention by originality in subject and treatment, being generally representations of wild and savage scenes, executed with a freedom and decision remarkably appropriate. Salvator executed numerous etchings, highly characteristic of his peculiar style.

ROSA'CEA, known also as GUTTA ROSEA and ACNE ROSACEA, is a disease which usually first appears at or near the end of the nose; and in some cases it is confined to the nose, while in others it extends to the cheeks, forehead, chin, or even to the whole face. The skin in the part affected assumes a deep red color, which usually disappears after a time, but returns either on no special provocation, or in consequence, apparently of some gastric disturbance, and after a time becomes permanent; pustules of acne—a chronic pustular disease of the skin—now appear, and their yellowness contrasts strongly with the redness with which they are surrounded. The skin of the diseased part becomes irregularly swollen, and is marked with blue or red streaks, caused by congestion and enlargement of the capillaries; the whole surface, in a severe case, presenting a very disagreeable and repulsive appearance. This affection is no doubt often a result of intemperate living, but it may occur in persons of regular habits of life. Disorder of the digestive system is so often associated with it as to exclude the idea that the combination is accidental, and the skin disease may often with great probability be referred to gastric disturbance as the exciting cause. The disease is confined almost exclusively to persons in middle or advanced life, and women are especially liable to it about the period in which what is popularly known as the "change of life" occurs: moreover, it has occasionally been observed to be hereditary. The general treatment consists in the administration of the compounds of iodine and mercury (singly or conjoined) in alterative doses, and Donovan's solution has been especially recommended; and a nourishing but bland and non-stimulating diet should be prescribed. In the early stages of the disease the local treatment should be soothing. Emollient lotions, such as emulsion of bitter almonds, cream, glycerine, tc., may be occasionally used during the day, and in severe cases a bread poultice may be applied to the face at night. When the affection becomes indolent the emollients should be gradually replaced by stimulating applications, such as Eau de Cologne, or a solution of corrosive sublimate in alcohol, in the proportion of from 1 to 2 grains in the pint; and at a still later stage iodide of sulphur ointment, in the proportion of 15 grains, or a scruple of the iodide to an ounce of lard, is well deserving of a trial. When the disease is of long standing it sometimes defies all known remedies.

ROSACEÆ, a natural order of exogenous plants, containing many species of great usefulness, and many that are in the highest esteem for their beauty. It contains trees, shrubs, and herbaceous plants, natives chiefly of cold and temperate regions, and far more abundant in the northern than in the southern hemisphere. Within the tropics they are chiefly but not exclusively found in elevated situations. The leaves are alternate, have stipules, and are either simple or compound. The flowers are generally hermaphrodite, but sometimes unisexual; the inflorescence various. The calyx is 4 or 5 lobed, generally 5 lobed; the petals as many as the divisions of the calyx, or occasionally wanting, perigynous. The stamens are few or many, arising from the throat of the calyx; the ovary sometimes solitary, sometimes there are several ovaries; each one-celled, with a lateral style; or a number of ovaries are united into a many-celled pistil;

the ovules generally two or more. The fruit is sometimes a drupe; sometimes a pome; sometimes follicular; sometimes an achœnium; sometimes a heap of achœnia, or of one-seeded berries; sometimes a heap of achœnia, covered with the fleshy tube of the calyx.—This natural order contains at least 1000 known species; but in some of the genera, as *rosa* and *rubus*, the determination of the species is attended with great difficulty, and varieties—sometimes reckoned species—are numerous.—The order, as generally received, is divided into a number of suborders, several of which have by some botanists been elevated to the rank of distinct orders, as *amygdaleæ, pomaceæ, sanguisorbeæ*. See also Rose, Rubus, Strawberry, Potentilla, Tormentil, Agrimony, Geum, Spiræa, Cusso, etc.

ROSAMOND, usually called Fair Rosamond; daughter of Walter, lord Clifford. She was the favorite mistress of Henry II., who is reported to have secreted her in a labyrinth at his palace of Woodstock, where, according to some writers, she was discovered and poisoned by the queen Eleanor. This story is not supported by history, and it is more probable that she died in the nunnery of Godstow, in Oxfordshire, about 1173. Her two sons by Henry II. were William Longsword, earl of Salisbury, and Geoffrey, bishop of Lincoln. She was buried in the church of Godstow, opposite to the high altar, where her body remained till it was ordered to be removed, by Hugh, bishop of Lincoln, in 1191.

ROSA, MONTE. See Monte Rosa, *ante*.

ROSA'RIO, a t. of the Argentine Republic, on the right bank of the Parana, 170 m. n.w. from Buenos Ayres, 210 m. by river. It is the most important town on the Parana, and is rapidly increasing in population and commerce. The customs duties amount to considerably over £140,000 a year. In 1874 the value of merchandise imported direct was $7,046,400; of the exports, $2,101,100, of which $1,073,540 consisted of wool, hides, etc., sent to the United States. Pop. above 40,000.

ROSARY OF THE BLESSED VIRGIN MARY (Lat. *rosarium*, a chaplet of roses), the name given to a very popular form of prayer in the Roman Catholic church. The name rosary has been variously traced either to the title "Mystical Rose," one of the titles under which the Blessed Virgin is addressed in the litany of Loretto (q.v.), or to St. Rosalia's wreath of roses, well known in sacred art, or to the beads being originally made commonly of rosewood. The origin of the devotion itself is popularly traced to St. Dominick (q.v.); but it is quite certain that its characteristic feature, the use of beads as a means of reckoning the number of repetitions of a certain prayer, is of far greater antiquity. See Beads. Palladius tells of the abbot Paul, whose daily practice it was to repeat the Paternoster 300 times, that he used a number of small pebbles to secure a correct enumeration, dropping one of these into his lap at each repetition. Later, a string of beads, worn round the neck, and called *beltidum*, was substituted. As the same use of beads exists among the Mohammedans, some writers have traced the Roman Catholic practice to a Mohammedan origin; but it appears quite certain that the practice existed among Christians before the time of Mohammed. Originally, the prayer so repeated was the Lord's Prayer; but when, in the 11th and 12th centuries, the so-called angelical salutation, "Hail, Mary!" etc., became a frequent form of prayer, it was added to the "Our Father;" and it seems beyond all doubt that the rosary in its present form was, if not devised, at least fully introduced and propagated by St. Dominick. The rosary, although called of the Blessed Virgin Mary, is a series of fifteen prayers, founded on the chief mysteries of the incarnation and passion of our Lord, interspersed with repetitions of the "Our Father," the "Hail, Mary!" and the doxology. It consists of three parts, each of which contains five so-called mysteries, connected with our Lord's incarnation and public mission on earth, his passion and death, his resurrection and ascension, and the assumption of the Blessed Virgin Mary. Each of these parts thus contains five mysteries (called also "decades" from the ten "Hail, Maries") consisting of (1) a "meditation," briefly proposing the mystery which is to be meditated upon; (2) one "Our Father;" (3) two "Hail, Maries;" (4) one doxology; (5) a prayer begging for the special grace or fruit appropriate to the particular mystery. The whole rosary, therefore, consists of 15 mysteries or decades, and thus comprises 15 "Our Fathers" and "Doxologies," and 150 "Hail, Maries." The devotion of the rosary takes several forms. The "Greater Rosary" consists of the recitation of the whole fifteen mysteries or decades, with their component prayers. The "Lesser Rosary" consists of one of the three parts, or of five mysteries or decades. The "Living Rosary" is recited by an association of fifteen individuals, each of whom engages to say daily one mystery. When recited publicly, the prayers are repeated alternately by the priest or other person presiding at prayer, and by the congregation. There is a form of the rosary common in foreign countries, especially Germany, in which the substance of each "mystery" is condensed into a short prayer of three or four words, which are appended to the "Hail, Mary!" and thus serve perpetually to recall the subject to the mind of the person praying vocally. The rosary has been sanctioned and recommended by numberless popes and other ecclesiastical authorities, and indulgences (q.v.) have been granted to persons reciting it with proper dispositions. It is regarded by Roman Catholics as one of their most excellent forms of prayer, and as placing the devotion to the Blessed Virgin Mary on its true footing—that of a devotion to the incarnation and death of her Son, Jesus

Christ. It is expressly recommended for the poor and the ignorant; and there are instructions specially designed for these classes, in order to enable them to combine prayer of the mind with prayer of the lips.

The mechanical instrument, so to speak, of this devotion is also called by the name rosary. It consists of a string of beads, equal in number to the "Our Fathers" and "Hail, Maries" which are recited in the rosary—the "Our Father" beads being of a larger size—one of which is passed through the fingers at each recitation of the prayer, and thus secures the person praying from errors of memory. The beads are of various material—berries, wood, stone, ivory, metal, etc., and are often of costly workmanship, and of considerable intrinsic value. They are blessed for the use of the people by the pope, by bishops and superiors of religious orders, and by others having special power for the purpose.

ROSAS, Don Juan Manuel, president of the Argentine Confederation, b. at Buenos Ayres in 1793, descended from an ancient family of the Asturias. He entered the army of Buenos Ayres, and in 1829 rose to be governor or capt.gen. of his native province, then in federal union with Entre Rios, Corrientes, and Santa Fé. He showed great courage and capacity in subduing the disaffected Indians, and internal peace being thus secured, he turned his attention to the state of the confederation, which, in 1835, was falling to pieces by the feebleness of its governments. A single president was, upon his recommendation, elected for the whole Argentine Confederation, and the choice fell upon Rosas. His residence was to be Buenos Ayres, and to this state were intrusted the external relations of the confederation, and the management of the more important functions of the executive. Intestine commotion subsided under his rule, the industrial resources of the country were developed, and foreign commerce rapidly increased. The other states, however, became jealous of the growth and power of Buenos Ayres, and Rosas was accused of a design to extend and uphold the undue predominance of his state, and to give his native city a monopoly of the trade of the river Plate. In the execution of this design, he sought to compel Paraguay to join the confederation. This involved Rosas in a war with Brazil, in which his troops were outnumbered, yet he obstinately kept up the struggle for five years. An attack on Montevideo was also rendered necessary by his policy; but England and France interfering for the protection of that city, Rosas was again defeated; yet he managed to resist the allied forces from 1845 to 1850. His rule had by this time become so oppressive and intolerable that the subject states revolted, and selected don J. J. Urquiza as their president and general. A battle ensued at Monte-Caseros, Feb. 3, 1852, when Rosas's forces were put to flight Urquiza entered Buenos Ayres as president of the confederation; and Rosas, who was compelled to flee, obtained a refuge in England, in which country he for the most part resided till his death in March, 1877.

ROS'CIUS, Quintus, was b. at Solonium, a village near Lanuvium, and rose to be the greatest comic actor in Rome. So much was he admired that many of the Roman aristocracy befriended him, and the dictator Sulla, as a token of favor, presented him with a gold ring, the symbol of the equestrian order. Among his most admiring and affectionate patrons, Roscius also numbered Cicero, who, at the commencement of his career, received lessons in the art of elocution from the great comedian, and even in later life used to make trials of skill with his instructor as to which of them rendered a thought most clearly and effectively—the orator by his diction, or the comedian by his gesticulation. So sensible was Roscius of the distinction he enjoyed in sharing the intimacy, and even the friendly emulation of the great orator, that he came to look upon his art as one of no small importance and dignity, and wrote a treatise on the comparative methods and merits of eloquence and acting. Cicero's friendship was of use to him in another way, for on his being sued at law by C. Fannius Chærea for the sum of 50,000 sesterces, Cicero defended him before the judex Piso (probably 68 B.C.) in his extant oration *Pro Q. Roscio Comœdo.* He died 62 B.C., having attained such perfection in his peculiar art that to be a "Roscius" became synonymous with pre-eminence in every profession, and leaving, like his famous contemporary, Æsopus the tragedian, an immense fortune, realized upon the stage.

ROSCOE, Henry Enfield, b. London, 1833; educated at University college, London, and at Heidelberg, where, in association with Bunsen, he published several memoirs on chemical subjects. He has been professor of chemistry in Owens college, Manchester, since 1857. Among his works are *Elementary Lessons in Chemistry*, 1866; and *Lectures on Spectrum Analysis*, 1867. He was associate editor with Huxley and Balfour Stewart of Macmillan's *Science Primer.*

ROSCOE, William, the eminent historian of Lorenzo de' Medici and Leo X., was b. near Liverpool on March 8, 1753. His father was a market-gardener, whose assistant in this business he became in his twelfth year, after receiving the rudiments of learning at a common school. In this occupation he continued for about three years, during which his fondness for reading developed itself; and in 1769, after making trial for a year of a book-seller's shop, he was articled to an attorney at Liverpool, where, in 1774, being admitted an attorney of the court of king's bench, he began to practice on his own account. During all this period he assiduously cultivated his mental powers, turning his attention to the classics, and especially to the Italian language and literature. In 1773 he first appeared in print as the author of a poem; and in 1777 a collection of some of his earlier pieces was published, containing his first protest against the slave-trade, of which, throughout his life, he was a strenuous opponent. In 1796 was published the first volume of his *Life of Lorenzo de' Medici, called the Magnificent*, which had been begun many years before, and in the composition of which he was greatly aided by the collection for him of valuable materials in Italy, from sources in print and manuscript, by his friend Mr. Clarke. The success of this work was extraordinary, and it at once established his literary reputation. The work was received with the highest approbation by those who were best able to appreciate its merits, both in England and on the continent, especially in Italy; it went through several editions, and was translated into German, French, and Italian. In 1805 appeared his second great work, the *Life and Pontificate of Leo X.*, for which, with the assistance of others, he had been collecting materials for many years. This work also, which, like the former, appeared successively in German, French, and Italian, was received with much commendation by the most impartial judges, though its tone and spirit, especially with reference to the reformation, was severely criticised by others.

Roscoe at one time had thoughts of adopting the bar as a profession; but about the year 1800, he became partner in a Liverpool bank, a step which involved him eventually in great pecuniary embarrassment. In 1806 he was returned to parliament for Liverpool in the whig interest, and had the gratification of taking part in the abolition of the slave-trade, but did not again come forward after the dissolution in 1807. He was, throughout, a consistent opponent of the war with France, against which he published several pamphlets, and was on all points the advocate of liberal opinions. He took an active part in founding the Liverpool royal institution, and was a zealous promoter of literature, and patron of the fine arts. Roscoe died at Liverpool, June 30, 1831. During the latter years of his life, he devoted himself much to the study of botany, and in honor of him a rare genus of monandrian plants received in 1826 the name *Roscoea*.

ROSCOMMON, a co. in n.e. Michigan, crossed by the Jackson, Lansing and Saginaw railroad; drained by the s. branch of the Au Sable, and by the Muskegon and Titibawassee rivers; 576 sq.m.; pop. '80, 1459. The surface is uneven and nearly covered with forests, principally of pine trees; the soil is poor. It has many lakes, the largest of which are Higgins's and Houghton's, the latter being 11 m. long. Co. seat, Roscommon.

ROSCOMMON, an inland co. of Ireland, in the e. of the province of Connaught, and bounded on the e. by the river Shannon, is 60 m. long from n. to s., by 40 m. from e. to west. Area, 607,691 acres, of which 440,522 are arable. Pop. '71, 140,670. 737 persons speak Irish only. Number of pupils on the roll of the national schools in Dec., 1875, 32,654 (of whom 32,186 were Roman Catholics). Number of emigrants from Roscommon between 1851 and 1871, 52,299. The surface of Roscommon, which belongs to the central plains of Ireland, is level, with undulations rising in the s. into the Slieve Bawn range, the highest point of which is 867 ft. in height; and on the n., into the Curlew mountains, of which Slieve Curkagh attains a height of 1098 feet. Its principal rivers are the Shannon (q.v.) and the Suck. Roscommon communicates by means of the Midland Great Western, and the Southern and Western, and Northwestern railways, with all the extremities of the kingdom. In geological structure it belongs to the central limestone formation, in some districts of which the sandstone protrudes. The soil in the central district is in general light, but fertile, and affords the finest sheep-pasture in Ireland—the celebrated "plain of Boyle." Some portions also contain a rich and fertile loam, which produces good cereal crops; but the chief industry of the Roscommon farming population is the feeding of sheep and cattle, especially the former.—The county can hardly be said to possess any manufacture worthy of mention. The chief towns are Roscommon (q.v.), Boyle, Castlerea, Elphin, Strokestown. Ballinasloe and Athlone lie upon the border, and are partly within this county. Roscommon, in the ante-English period, was the country of the septs of MacDermot, O'Daly, O'Kelly, and above all, O'Conor, of which there were two branches, that of the O'Conor Roe (red), and that of O'Conor Don or Dhun (brown). The present representative of the O'Conors, the O'Conor Don, is one of the very few Irish princes who have succeeded to the hereditary estates of their ancestors.

Roscommon sends two members to the imperial parliment. It possesses a vast number of antiquities of the Celtic period, raths, etc.; a portion of a round tower at Oran, several remains of strong castles of the English period, and some fine ecclesiastical ruins, of which Boyle, Roscommon, Tulsk, and Clonshanville are the principal.

ROSCOMMON, the capital and assize t. of the co. of the same name, Ireland, in the middle of the county, 96 m. w. by n. from Dublin. The pop. in '61, was 2,699; in '71, 2,875. Of the inhabitants less than 300 are Protestants. Roscommon dates from the 13th c., when it arose around a Dominican abbey, founded by the O'Conor in 1257, and a castle built soon after by sir Robert de Ufford, the remains of both of which structures still exist. Roscommon is a market-town, in which corn is the principal commodity. It has scarcely any manufacture, and little commercial enterprise of any kind. It returned two members to the Irish parliament, but was disfranchised at the union. Two newspapers are published here.

ROSCOMMON, WENTWORTH DILLON, Earl of, 1634–84; b. Ireland; nephew of the earl of Strafford; retired to the continent after the impeachment of his uncle. After the restoration he held various court positions, married a daughter of the earl of Burlington, and devoted himself to literature. He wote an *Essay on Translated Verse; Horace's Art of Poetry Translated into English Blank Verse*, and a collection of prologues and epilogues to plays. He was buried in Westminster abbey.

ROSCREA', a market t. of the co. of Tipperary, Ireland, 94 m. s.w. by w. from Dublin, with which it is connected by a branch from the Great Southern and Western railway. The pop. in 1861 was 3,543; in 1871, 2,992. Of this number 470 were Protestants of the Episcopal church. Roscrea is a very ancient town, dating back to the early Christian period, when a monastery was built upon this site in the beginning of the 7th century. The modern town is tolerably well-built; the Roman Catholic church is a handsome structure; and there are considerable remains of the ancient greatness of the place—a castle, a lofty round tower 80 ft. high, and ruins of two abbeys. The only manufacture is coarse woolen cloth, but there is a considerable market for agricultural produce. There are several schools, some with endowments of ancient date.

ROSE, *Rosa*, a genus of plants of the natural order *rosaceæ*, consisting of shrubs, generally with prickly stems and pinnate leaves, the leaves terminating in a single leaflet; stipules at the base of the leaf-stalks; the calyx 5-fid, its tube contracted at the summit, and finally becoming fleshy, and forming a chief part of the fruit; the corolla of five petals; the stamens numerous; the styles springing from the narrowed throat of the calyx, free, or aggregated into a column. The flowers are generally of the red tint well known as *rose-color*, but sometimes white, more rarely yellow, and sometimes striped. The fruit (*hip* or *hep*) consists of the enlarged and colored tube of the calyx, within which are contained many *achenia* (q.v.) amid prickly hairs. The species are very numerous, even after allowance has been made for a great number of varieties elevated into species. There is no genus of plants in which the limits of species are more difficult to define, or in which varieties are more apt to be regarded as species. In Withering's *British Botany*, published near the end of last century, only five British species of rose are given; in Hooker and Arnott's *British Flora*, 19 species are recognized, while. many forms, reckoned as species by some botanists, are noticed as mere varieties Roses are natives of all the temperate parts of the northern hemisphere, and of its colder regions, even to Lapland and Hudson's bay. They have long been among the chief favorites in flower-gardens for the beauty and fragrance of their flowers; and, more than any other flower, emblems of everything beautiful and delightful. Countless varieties—single and double—have been produced by cultivation, which it is often extremely difficult to refer to their original species.—Among the ancients the rose was sacred to Eros or Cupid, and Aphrodite or Venus, and was accounted the emblem of joy and love, and at the same time of prudence. Its opening buds are a favorite poetic image of innocence and purity.—Among the roses best known to the ancients was the HUNDRED-LEAVED ROSE (*R. centifolia*), excelled by no other species in beauty and fragrance. It is a native of the Caucasus, and has been cultivated in gardens from very ancient times. Among its numberless varieties are the MOSS ROSE, the calyx of which sends forth branching excrescences, so that it seems overgrown with moss, the flower—which is only known as a double rose—being exquisitely beautiful and fragrant; the PROVENCE or CABBAGE ROSE, one of the most common, and also one of the finest roses; the small-flowered BURGUNDY ROSE, etc.—The FRENCH ROSE (*R. Gallica*) is a native of the s. of Europe. Many varieties of it are cultivated, particularly very beautiful double ones. It is distinguished by its hard leaves, which have a peculiar dryness, and its much expanded petals. It has a fainter smell than *R. centifolia*, but its petals are more astringent, and are preferred for the preparation of *vinegar of roses* and *conserve of roses*.—The DAMASCUS or DAMASK ROSE (*R. Damascena*), a native of Syria, is much cultivated, and is sometimes called the MONTHLY ROSE, which name, however, is more frequently given to the China rose.—The MUSK ROSE (*R. moschata*) is a native of the n. of Africa and the s. of Spain. Its flowers have a strong and delightful fragrance; they are white, and disposed in rich corymbs. It has been cultivated in England since the end of the 16th century.—The DOG ROSE (*R. canina*) is common in Britain and throughout Europe, also in the n. of Asia, growing in thickets and hedges. It varies, even in a wild state, in the color of its flowers, which are red, pale, or white. It has long straight shoots, which are often used as stocks for ornamental rose-trees, other kinds of rose being budded upon them. The bark of the root was formerly esteemed of peculiar virtue in preventing fatal consequences from the bite of a mad dog; whence the name of the species.—The VILLOUS ROSE (*R. villosa*), another common British species, has the fruit larger and more fleshy than the dog rose. The leaves are downy.—The FIELD ROSE (*R. arvensis*) is common in many parts of Britain, in woods and hedges. It has white flowers. It is remarkable for its trailing habit and long climbing or pendulous twigs, on account of which it is frequently planted and trained to cover walls and trellises. It is often called the AYRSHIRE ROSE, although that name is shared by another kind of similar habit, which is regarded as a deciduous variety of the EVERGREEN ROSE (*R. sempervirens*), a native of the s. of Europe. These often make shoots of 20 ft. in a season. Of the same habit also is the MANY-FLOWERED ROSE (*R. multiflora*), a native of

China and Japan, a very fine species, but not sufficiently hardy for the colder parts of Britain.—Very different in habit is the SCOTCH ROSE, or BURNET-LEAVED ROSE (*R. spinosissima*), a species common on heaths, sands, and chalk downs, in many parts of Britain; a low compact bush, with very small leaves and flowers. It is occasionally found in unfertile situations, so dwarfed in size as not to measure more than 3 in. from the very tip of the root to the center of the flower (which is undiminished in size). Many fine double varieties are now in cultivation.—The ALPINE ROSE (*R. Alpina*) is a beautiful ornament of the Alps and of other mountains of central Europe, remarkable for its flower-stalks bending down in an arch after flowering.—The SWEET BRIER ROSE (*R. rubiginosa*) is a bushy species, with small leaves and flowers, a native of Britain, but more common in some parts of continental Europe, growing in open bushy places, and remarkable for the sweet balsamic smell of its leaves, on account of which it is much planted in hedges and shrubberies. A kindred species (*R. suaveolens*) is found in North America.—The YELLOW ROSE (*R. lutea*), a native of Germany, is chiefly remarkable for the color of its flowers, which, however, have a disagreeable bug-like odor. A fine variety is much cultivated, with petals yellow externally, and bright red on the inside. —The INDIAN ROSE, or CHINA ROSE (*R. Indica*), is a native of China, was thence carried to India, and is now also common in Europe, being a hardy plant which does not suffer from the frosts of winter in any part of Britain, although it was at first introduced as a green-house plant. It is one of the most important additions recently made to our flower-gardens and shrubberies; flowering not only in the middle of summer, with the other roses, but throughout the year, even in winter, when the weather is mild. It is now very common throughout Europe. The name MONTHLY ROSE is often given to it from a notion that it flowers every month. The NOISETTE ROSE, remarkable for its extremely rich corymbs, and the TEA ROSE, of which the dried leaves have a fine fragrance, and are said to be used in China for flavoring tea, are regarded as varieties of it. The odor of the flower is much fainter than that of many other roses; and the bush is never large.

Some kinds of rose, as the China rose, are easily propagated by cuttings, the other kinds by layers. The finer varieties are budded on stocks of some common kind. Many of the kinds require much pruning and attention of the gardener. The old shoots are cut out, and the young wood thinned and shortened. The flowering of a rose-bush may be retarded by cutting it closely down late in spring, and it will blossom when other roses have disappeared. Roses grow well in all ordinary soils, but are very sensitive to atmospheric influences, and do not succeed amid the smoke of towns.

The genus *lowea* has been separated from *rosa* by Lindley, chiefly on account of the simple leaves. The only known species is a native of central Asia.

The fruit of roses is used in medicine. See HIP. A mildly astringent and agreeable syrup, and other preparations, are made from the rapidly dried petals and buds of the French rose. A syrup is similarly made from the petals of the hundred-leaved rose; and water distilled from them, *rose water*, is employed for various purposes on account of its agreeable odor. *Rose vinegar*, made by steeping rose petals in vinegar, is useful as an external application in headaches, for dissipating unpleasant smells in apartments, etc. *Conserve of roses* is made of the petals of roses pounded with sugar, and is useful as an astringent in diarrhea of children. Oil or attar (q.v.) of roses is one of the most valuable of perfumes.

Rose-bushes are often much injured by a species of aphis (*A. rosæ*), a small green insect, which swarms upon the leaves. A reddish fungus, *puccinia rosæ*, ofter covers the leaves in the latter part of summer.

ROSE, in heraldry. The heraldic rose is drawn in a conventional form, and never with a stalk, except when expressly directed by the words of blazon. Being sometimes argent and sometimes gules, it cannot be designated proper; but when blazoned "barbed and seeded proper," it is meant that the barbs are to be green, and the seeds gold or yellow. The rose gules was the badge of the Plantagenets of the house of Lancaster, and the rose argent of that of York. The York rose was sometimes surrounded with rays as of the sun, and termed *rose en soleil*. As a mark of cadency, the rose has been used as the difference of the seventh son.

ROSE, THE, a popular name for erysipelas (q.v.), which is also known as St. Anthony's fire, *Ignis Sacer*, etc.

ROSE, HENRY JOHN, 1801–73; graduated at St. John's college, Cambridge, in 1821; became fellow in 1824; Hulsean lecturer in 1833; rector of Houghton Conquest, Bedfordshire, in 1837; archdeacon of Bedford in 1866. He edited the *Encyclopædia Metropolitana;* translated Neander's *History of the Christian Religion and the Church during the First Three Centuries*, 2 vols.; and was one of the authors of the *Speaker's Commentary*. He published *The Law of Moses*, etc.; *History of the Christian Church*.

ROSE, HUGH JAMES, 1795–1838; b. England; educated at Trinity college, Cambridge; ordained deacon; and became in 1818 curate of Uckfield, Surrey, and in 1821 of Horsham, Surrey; in 1825 select preacher at Cambridge; in 1826 chaplain to bishop Howley, and prebendary of Chichester, 1827–33; rector of Hadleigh, Suffolk, in 1830, and of Fairstead and Werley in 1833, soon leaving the last for St. Thomas, Southwark. In 1833 he was made professor of divinity of the university of Dublin; in 1834 chaplain to the archbishop of Canterbury; in 1836 principal of King's college, London. He published *Christianity Always Progressive; Notices of the Mosaic Law; The Gospel an Abiding System;* and an edition of Parkhurst's *Greek Lexicon.*

ROSE ACACIA. See ROBINIA.

ROSE APPLE. See EUGENIA.

ROSE BEETLE, *Cetonia aurata,* a coleopterous insect of the section *pentamera,* of the tribe *lamellicornes,* and not distantly allied to cockchafers and to the true beetles, or *scarabæi.* It is a common British insect, about 1 in. long, of a shining green above, coppery red underneath, with white marks on the elytra. In its perfect state it frequents flowers, particularly the rose; in its larva state it inhabits rotten timber, the roots of vines, etc., and is often found in ants' nests, apparently feeding on the small particles of wood which the ants have collected. It remains about three years in the larva state, makes a cocoon of particles of wood, glued together by an excretion of its own; passes the winter as an inactive pupa, and appears in summer in its perfect form. It flies well, with a sort of humming noise, from flower to flower, feeding on honey, and, in order to reach it, devouring the nectaries.—In North America the name rose beetle is given to another coleopterous insect of the tribe *clavicornes,* about one-third of an inch in length. It is very injurious to gardens and nurseries in North America, its ravages extending to many plants besides the rose. These insects often appear suddenly in swarms, and disappear as suddenly.

ROSE-BUG, *Melonotha subspinosa,* a coleopterous insect about ½ of an inch long, buff yellow color on the back, and white beneath. It has been known in New England between 50 and 60 years. It emerges from the ground about the second week in June, appearing in swarms, remaining a little over a month. The males then die and the females re-enter the earth, lay their eggs, and come again to the surface and die. The eggs, which are about one-thirtieth of an inch in diameter, hatch in about 20 days, when the larvæ commence to feed upon tender roots, attaining about three-fourths of an inch in length by autumn. They have six short legs, a pair to each of the first three rings behind the head. In October they descend into the earth beyond the reach of frost and hibernate till spring, when they gradually come toward the surface, and are in May transformed into pupæ, which in June become beetles, dig their way to the surface to feed upon the rose and other plants, and again go through the changes above described. It is during the insect state that they must be attacked for the purpose of reducing their numbers or exterminating them. They should be shaken from the plants and destroyed. Insectivorous birds (q.v.) destroy great quantities of them.

ROSE'CRANS, WILLIAM STARKE, b. Ohio, 1819; graduated at West Point, and became assistant engineer on the fortifications at Hampton Roads. He was professor of engineering and natural philosophy at West Point, 1844–47, and resigned from the army in 1854 to go into business. At the beginning of the war he volunteered as aid-de-camp to gen. McClellan, then in command of the department of the Ohio. He was soon made brig.gen., was prominent in the campaign in West Virginia, and took command of that department on the promotion of McClellan to the chief command. Made maj.gen. of volunteers early in 1862, and, commanding the army of the Mississippi, he won the battles of Iuka and Corinth in the fall of that year. Placed in command of the army of the Cumberland, he fought with Bragg at Stone river, Dec. 26, 1862, to Jan. 2, 1863. Having crossed the Tennessee river and the Cumberland mountains he was defeated by Bragg at the battle of Chickamauga, Sept. 19 and 20, and soon afterward was succeeded by gen. Thomas. In 1864 he took command of the department of the Missouri. He resigned from the U. S. army in 1867. He was for a short time minister to Mexico, 1868–69, and was elected to congress from California in 1880.

ROSE-ENGINE. See TURNING.

ROSELLI'NI, IPPOLITO, 1800–43; b. Pisa, Italy; educated at the universities of Pisa and Bologna, making a specialty of archæological study and philology. In 1824 he was made professor of oriental languages at Pisa. He accompanied Champollion, the famous orientalist, in explorations in Italy, and, in 1828, through Egypt and Nubia. The results of their investigations were published in *I Monumenti dell' Egitto e della Nubia,* in 10 vols., 8 of which were published before Rosellini's death.

ROSE'MARY, *Rosmarinus,* a genus of plants of the natural order *labiatæ,* and nearly allied to sage (*salvia*), from which it differs in its filaments having an awl-shaped tooth, directed downward a little above the base. Only one species is known, *R. officinalis,* an evergreen erect shrub of 4 to 8 ft. high, with linear leaves, and pale bluish flowers, growing in sunny places, on rocks, old walls, etc., in the countries around the Mediterranean sea, and generally cultivated, as an ornamental and aromatic shrub, throughout the rest of Europe. The leaves have a short whitish-gray down beneath, a penetrating champhor-like odor, and a pungent aromatic and bitter taste. They contain a large quantity of an essential oil, *oil of rosemary* ($C_{45}H_{38}O_2$), which is not unfrequently used as a stimulating liniment, to promote the growth of the hair, and as a perfume. *Spirit of rosemary,* made by distillation of sprigs of rosemary with rectified spirit, is used to give a pleasant odor to lotions and liniments. Rosemary has been advantageously administered internally in cases of chronic diarrhea, and of a relaxed state of the system.—Oil of rosemary is a principal ingredient of the perfume called *Hungary water*, or *queen of Hungary's water*.—The name wild rosemary is given to *ledum palustre*, a shrub with narcotic acrid properties.

ROSEN, FRIEDR. AUG., b. in Hanover, Sept. 2, 1805, entered Leipsic university in 1822, where he devoted himself to the study of the biblico-oriental languages, and went to Berlin in 1824, where he studied Sanskrit under Bopp, and published his first work, *Radices Sanscritæ* (Berl. 1827). Subsequently, he was called to London university as professor of oriental literature, where he edited the oldest of the still extant Arabic hand-books of algebra, by Mohammed ben Musa (Lond. 1831). In 1831 Rosen resigned his professorship. During the next few years he wrote a portion of the oriental articles for the *Penny Cyclopædia*, undertook the revision of the Sanskrit Bengali dictionary of Houghton (Lond. 1835), which may be considered entirely his own work, and compiled for the British museum the catalogue of Syrian manuscripts, which was only published after his death (Lond. 1839). As secretary of the Asiatic society, he conducted its entire foreign correspondence. Colebrooke intrusted to him the publication of his *Miscellaneous Essays* (2 vols., Lond. 1837). In 1836 he had begun the publication of the collection of hymns of the *Rigveda*, when he died Sept. 12, 1837. His unfinished work on the Vedas was published by the Asiatic society under the title *Rigveda-Sanhita, liber primus, Sanscrite et Latine* (Lond. 1838).—His younger brother, GEORG ROSEN, has also acquired a reputation as an oriental scholar.

ROSENAU, a t. of Hungary, beautifully situated on the Sajo, 105 m. n.e. of Pesth. It has colleges and a Franciscan convent. There is mining done in the neighborhood, and there are manufactures of woolen cloth and linen, of stone-ware, leather, and paper. Pop. '69, 4,855.

ROS'ENKRANZ, JOHANN KARL FRIEDRICH, b. Germany, 1805; educated at Halle, where he was professor, 1831–33. He studied the philosophies of Schleiermacher and Hegel, and in 1833 became professor at Königsberg, where he remains, succeeding Herbart and Kant. He belongs to the so-called "center" group of Hegelians. Besides his works in general literature, he has done much in the way of a reclassification of Hegel's system. Among his works are *Psychology*, 1837; *Critical Explanations of Hegel's System*, 1840; *History of Kant's Philosophy*, 1840; *Life of Hegel*, 1844; *Science of the Logical Idea; Hegel as the National Philosopher of Germany*, 1870; and *New Studies*, 1875.

ROSENMÜLLER, JOHANN GEORG, a German divine and professor of theology was b. at Ummerstädt in Hildburghausen, Dec. 18, 1736. He was appointed professor of theology at Erlangen in 1773, primarius professor of divinity at Giessen in 1783, and was called in 1785 to Leipsic, where he remained till his death in 1815. His chief writings are: *Morgen-und Abendandachten* (7th ed. Leip. 1820); *Betrachtungen über die Vornehmsten Wahrheiten der Religion auf alle Tage des Jahres* (4 vols. Leip. 1801); *Auserlesenes Beicht- und Communionbuch* (12th ed. Nürnb. 1827); *Predigten über Auserlesene Stellen der Heiligen Schrift* (3 vols. Leip. 1811–13); *Beiträge zur Homiletik* (Leip. 1814); *Scholia in Novum Testamentum* (6 vols.; 6th edit. by his son, E. F. K. Rosenmüller, Leip. 1815–31); and his *Historia Interpretationis Librorum Sacrorum in Ecclesia Christiana* (5 vols. Leip. 1795–1814). After his death appeared *Handbuch eines Allgemeines fasslichen Unterrichts in der Christlichen Glaubens- und Sittenlehre* (2 vols. Leip. 1818–19).—ERNST FRIEDRICH KARL ROSENMÜLLER, eldest son of the foregoing, distinguished himself as a biblical critic and orientalist. He was born at Hessberg in Hildburghausen, Dec. 10, 1768, studied at Leipsic, became extraordinary professor of oriental literature in 1795, ordinary professor in 1813, and died Sept. 17, 1835. He was a more accurate and solid scholar and a keener critic than his father. He shared the rationalism of his time, but never carried it to an extreme. His masterpiece, the *Scholia in Vetus Testamentum* (11 vols. Leip. 1788–1835), is a most comprehensive and learned production, well worthy of consultation on any important point of biblical criticism. Other works of Rosenmüller's are: *Handbuch für die Literatur der Biblischen Kritik und Exegese* (4 vols. Gött. 1797–1800); *Das Alte und Neue Morgenland oder Erläuterungen der Heiligen Schrift* (6 vols. Leip. 1818–20); *Handbuch der Biblischen Alterthumskunde* (4 vols. Leip. 1823–31); *Institutiones ad Fundamenta Linguæ Arabicæ* (Leip. 1818); and *Analecta Arabica* (2 vols. Leip. 1825–26).—A younger brother, JOHANN CHRISTIAN ROSENMÜLLER (b. 1771, d. 1820), also acquired a reputation as a writer on anatomy, etc.

ROSE-NOBLE (commonly called also *penny of gold*), an English gold coin, first struck by king Edward III. in 1334, and current at the value of 6s. 8d. sterling; half-nobles, *oboli*, or gold half-pence, and quarter-nobles, otherwise called *gold farthings* and *quadrantes*, were also coined soon after. The term "rose-noble" was given to the coin because it was of the same value as the "noble," a money of account, and was stamped on one side with the figure of a rose. The rose-noble and its halves and quarters ceased to be coined after 9 Henry V.; but the "noble," the money of account, was used till a much more recent period.—The noble also existed in the Scotch coinage, and was equivalent to one-twelfth of the English coin.

ROSE OF JERICHO, *Anastatica hierochuntica*, a plant of the natural order *cruciferæ*, which grows in the sandy deserts of Arabia, and on rubbish, the roofs of houses, and other such situations, in Syria and other parts of the east. It is a small, bushy, herbaceous plant, seldom more than six inches high; with small white flowers; and after it has flowered, the leaves fall off, and the branches become incurved toward the center, so that the plant assumes an almost globular form, and in this state it is often blown about by the wind in the desert. When it happens to be blown into water, the branches expand again, and the pods open and let out the seeds. Numerous superstitions are connected with this plant, which is called *rosa Mariæ*, or *rose of the Virgin*. If taken up before it is quite withered, the plant retains its hygrometric property of contracting in drought and expanding in moisture, for years.

ROSE'OLA is a common skin disease, included in the division *rashes*, and sometimes described under the term *scarlet rash*. In some cases it begins with slight febrile symptoms and gastric disturbance, which subside in two or three days, when the rash appears; in other cases, no preliminary fever occurs. The eruption first appears upon the face, neck, and chest, in specks or small patches, which have a tendency to coalesce; and in severe cases the whole surface of the body assumes a uniformly red tint. The eruption is usually accompanied by itching of the affected parts, and by redness and slight soreness of the throat, and seldom lasts more than two or three days, when it gradually fades away; and its disappearance is not followed by the desquamation of epidermis, which is one of the natural *sequelæ* of scarlatina and certain other skin diseases. The rash differs considerably in appearance in different cases. The disease is never contagious, and one attack affords no immunity from a second.

Among the causes of roseola may be mentioned the irritation excited by dentition, gastric and intestinal irritation, excessive acidity of the stomach, the sudden checking of profuse perspiration, the drinking of cold water when the body is over-heated, etc. It often precedes the distinctive eruptions of small-pox and varioloid; and is noticed to be of most frequent occurrence during the prevalence of measles and scarlatina. The diseases with which it may be confounded are erythema, measles, and scarlatina, and it is sometimes impossible to discriminate with certainty between roseola and mild cases of scarlatina, when the former is attended with sore throat. The treatment is very simple, as the disease would probably always terminate favorably if left entirely to itself. If there is a suspicion that the case should turn out to be one of scarlatina, an emetic of ipecacuanha should be given, and the bowels should be freely acted on. In ordinary cases, a few days' confinement to the house, a spare and non-stimulating diet, saline laxatives—such as seidlitz powders—and an occasional warm bath, if there is much cutaneous irritation, or if the eruption has a tendency to recede too suddenly, constitute all the treatment that is expedient.

ROSE QUARTZ, a variety of quartz (q.v.), often crystallized in the form of rock-crystal (q.v.), but also found massive or imperfectly crystallized. It differs from common quartz and rock-crystal chiefly in its color, which is of a delicate pink or flesh-color, sometimes crimson or nearly so. The color is due to the presence of manganese. Rose quartz is valued as an ornamental stone, the larger masses being made into vases, etc., the smaller pieces into jewels, seals, etc. A bright red kind is known as *Bohemian ruby*, and is sometimes fraudulently sold as ruby.

ROSES, WAR OF THE, a disastrous civil contest which desolated England during the 30 years from 1455 to 1485, sacrificing 80 princes of the blood, and the larger proportion of the ancient nobility of the country. It was so called because the two factions into which the country was divided upheld the two several claims to the throne of the houses of York and Lancaster, whose badges were the white and the red rose respectively. After the house of Lancaster had possessed the throne for three generations (see PLANTAGENET). Richard, duke of York, whose title to the throne was superior to that of Henry VI., began to advance, at first somewhat covertly, his claim to the throne. In 1454 he was appointed protector of the realm during Henry's illness, and on the king's recovery he declined to give up his power, and levied an army to maintain it. For an account of the wars of the roses, see EDWARD IV., EDWARD V., RICHARD III., and HENRY VII. The accession of Henry VII. may be said to have terminated the wars of the roses, although the reign of Henry was from time to time disturbed by the pretensions of Yorkist impostors.

ROSETTA, a city of Egypt, situated on the w. bank of the old Bolbitic branch of the Nile, about 4 m. above the mouth, in 31° 25′ n lat. and 30° 28′ 20″ e. long. The name is supposed to be an old Egyptian one, and to have been derived from *rusat*, or the mouth of the plains. Here was discovered the so-called Rosetta stone, or trilingual inscription in the hieroglyphic, demotic or enchorial, and Greek language, which was the key to the interpretation of the hieroglyphs. It is of black basalt, about 3 ft. 7 in. in length, and 2 ft. 6 in. in width, containing about one-third of the hieroglyphic, and nearly all the Greek and Roman portions, the upper part and portion of the side having been broken away. The contents of the inscription are a decree in honor of Ptolemy Epiphanes by the priests of Egypt assembled in a synod at Memphis, on account of his remission of arrears of taxes and dues owed by the sacerdotal body. It was set up 195 B.C., and is the only one of the numerous examples ordered to be placed which has been brought to light. This monument was discovered in 1799 by M. Boussard, a French officer of engineers, during the French occupation of Egypt, in an excavation made at fort St. Julien, near Rosetta. More recent excavations have shown that it was found on the site of a temple dedicated by the Necho II. of the 26th dynasty to the solar god Atum, or Tum. By the Arabs, Rosetta is called Rashid. It first rose into importance when the accumulation of mud had silted up the Damietta branch, and destroyed the importance of that city. It has been much praised for its verdure and charming gardens, which present an agreeable contrast to the barren wastes by which it is surrounded. It contains a mixed population, supposed to be about 16,000 in number. The streets are narrow, running n. and south. The river has a sandbar at the mouth, preventing the entrance of large ships of war. It was unsuccessfully attacked by the British in 1807.

ROSETTA WOOD is a furniture-wood of a lively orange-red color, with very dark veins. It is imported from the East Indies in logs about a foot in diameter: but it is not known what tree produces it. It is little used, because, although extremely beautiful when first cut, the colors become dark by exposure.

ROSE-WATER. See PERFUMERY.

ROSE-WINDOW, a circular window with tracery.

ROSEWOOD, a name given to the wood of a number of different trees, valued for beauty, and used for ornamental furniture.—The rosewood of commerce has been thought to be the produce of a species of *mimosa*, a native of Brazil. It is also said that rosewood is the timber of several species of *triptolomea* (natural order *leguminosæ*, suborder *papilionaceæ*); but the trees yielding rosewood are, in general, still doubtful to the botanist, although different kinds of rosewood, imported from South America, are much used for veneering, in making furniture, musical instruments, etc. Rosewood has for a long time been second only to mahogany as a furniture-wood in Europe. It has a dark blackish-brown color, beautifully marked with streaks of dark red, and when being sawn or cut, yields an agreeable smell of roses, from which it receives its name. We receive it chiefly from Para and Maranham, in logs usually about 10 ft. in length; each log is only half the trunk, which is split in two to be sure it is sound. Violet wood and king wood are from similar trees. The name rosewood has been also given to kinds of timber grown in Jamaica, in Africa, and in Burmah. One valuable kind of rosewood is yielded by an East Indian tree, *dalbergia latifolia*, also called *blackwood*. It is found chiefly in Malabar, and grows to a height of about 50 feet. It is of the natural order *leguminosæ*, suborder *papilionaceæ*. The timber is very valuable. It is much used in Bombay for ornamental furniture. Planks of 4 ft. in breadth are sometimes obtained, after the sapwood has been removed. The increasing value of the wood has led to the formation of new plantations, under the care of the government conservator of forests, in several parts of the Madras presidency.

ROSICRU'CIANS, the name of a secret society of the 17th c., which is involved in much mystery, and the history of which has led to a great deal of discussion. The name is explained by Mosheim and others, as derived from *ros*, dew, and *crux*, the cross. CRUX is supposed mystically to represent LUX or light, because the figure + exhibits the three letters LVX; and light, in the opinion of the Rosicrucians, is that which produces gold. Now dew (*ros*) is the greatest solvent of gold in the ancient science of alchemy. But without insisting on this very mysterious explanation of the name Rosicrucians, we must be content with an account of the association itself. The beginning of the 17th c. was a period which manifested an extraordinary tendency to mysticism in science as well as in religion: alchemy, astrology, and divination divided the public interest with Pietism in the Protestant world, and the Convulsionist mania in the Catholic community. A remarkable impulse was given to this tendency by the simultaneous appearance of two anonymous books, printed at Cassel in 1614, in German, entitled *Universal and General Reformation of the whole wide World;* together with the *Fama Fraternitatis, or Brotherhood of the Illustrious Order of the R. C. (Rosy Cross); to the Rulers, States, and Learned of Europe; printed at Cassel, by William Wessel.* The first of these books is a kind of mystic allegory. In the reign of Justinian, Apollo, finding the world full of every kind of corruption, resolves on effecting a reformation; and with this view, calls up the seven wise men of Greece, and three Roman philosophers, of whom Cato and Seneca are the chief advisers. Their deliberation forms the subject of the book, which is a satire at once on the philosophy and the political systems and governments of the age. The *Fama Fraternitatis* is the story of a certain holy and reverend brother Christian Rosenkreuz (i. e., Rosy Cross), who is represented as living in the 14th century. This father, a German of noble birth, having been educated in a monastery, conceives a design for the reformation of the world; and after learning at Jerusalem and Damascus all the science of the Arabians, spends three years at Fez, in Morocco, in the study of the magical science of the Moors, and returns to Germany, where he establishes, in a house under the title Sancti Spiritus, with the aid of seven monks from the convent where he had been educated, a fraternity, which is the original brotherhood of the Rosy Cross. These adepts having framed a system with secret symbols, and committed it to paper, sent forth father Rosenkreuz to propagate the brotherhood, which was to be kept secret for 100 years, the members, however, meeting once each year in the mother-house of Sancti Spiritus. Rosenkreuz died at the age of 106, and the place of his burial was held secret by the adepts; but he ordered that an inscription should be

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placed on one of the doors of Sancti Spiritus: "Post cxx. annos patebo." In the following year, 1615, a third tract appeared, also in German, entitled *Confessio, or Confession of the Society and Brotherhood R. C.*, which purports to be a defense of the brotherhood from the false rumors in circulation regarding it. The mixture of absurdity with seeming fanaticism displayed in these books has long proved a literary puzzle, of which not the least plausible solution is that which regards them as simply a serio-comic satire on the philosophical follies of the time, written by Johann Valentine Andreä, of Herrenberg, as a mere exercise of humor, and without the intention or the expectation of their serious acceptance. Certain it is, that whatever was the secret of the Rosicrucians, if there really was any, it has been well kept. They are not heard of for the rest of the 17th c., and their supposed connection with the Illuminati of Weishaupt, at the close of the 18th c., is more than doubtful. Equally doubtful is the theory of their connection with the Templars. From a book entitled *Curious Things of the Outside World: Last Fire* (Lond. 1861), it would appear that the brethren of the Rosy Cross are not yet extinct. See Buhle, *Uber Ursprung und Schicksale des Ordens der Rosenkreuzer* (Gött. 1803); Jenning's *Rosicrucians* (1870).

ROSIN, Chemistry of. See Resins. When common turpentine (q.v.), obtained from several species of pine (q.v.) and fir (q.v.), is distilled with water, it yields nearly one-fourth of its weight of essential oil, while the residue in the retort consists of *common rosin*, or colophony. There are two principal varieties of rosin, one of which is of a brown, and the other of a white color. The brown variety is furnished by the Norway spruce fir, and is an amber-colored brittle solid, consisting of two isomeric acids, the *sylvic* and *pinic*, having the common formula, $C_{40}H_{29}O_3HO$. Pinic acid, which is the more abundant of the two, is soluble in cold alcohol, from which it is obtained on evaporation as an amorphous mass. When heated to partial decomposition, it yields another isomeric acid, the *colophonic*. The white variety of rosin, known commercially as *galipot*, is obtained from the turpentine yielded by *pinus maritima* (see Pine), and consists almost entirely of an acid, isomeric with the preceding, and termed the *pimari*. On evaporating its alcoholic solution, the acid is obtained in a semi-crystalline form; and on melting the mass thus obtained, and allowing it to cool, the resulting product is a colorless glass as clear as crystal.

Common rosin dissolves freely in alkaline solutions, and enters largely into the formation of yellow soap. The alkaline resinates are, in point of fact, true soaps, but are inferior in their cleansing properties to the stearates, oleates, and margarates. All the above described acids of rosin are monobasic, soluble in ether and hot alcohol, and insoluble in water.

ROS'KILDE, a t. in s.e. Denmark, called also Roar's Springs, in the island of Seeland, on an eminence overlooking a branch of the Ise-fjord river; pop. 5,221. Previous to 1443 it was the capital of the kingdom and the residence of the royal family, but its decline was consequent on the rapid growth of Copenhagen, and fire and the ravages of the plague destroyed its prospects. It contains a magnificent cathedral erected 1047-84, having many interesting monuments, and the tombs of Danish kings. In 1658 a treaty of peace was concluded here between Charles X. (Gustavus), of Sweden, and Frederick III. of Denmark. It is 19 m. s.w. of Copenhagen, with which it is connected by a railroad.

ROSMI'NI SERBATI, Antonio, 1797-1855, b. Italy; entered the priesthood in 1824. He founded a religious order, called "the brethren of charity," in 1828, and in 1833 became abbot of San Michele della Chiusa. There he founded the order called "sisters of providence." Pius IX. nominated him cardinal in 1848; but the nomination failed on account of Rosmini's work on church reform, called *The Five Wounds of the Church*, which, with his tract, *The Constitution According to Social Justice*, was put upon the *Index Expurgatorius*. His works are published in 35 volumes.

ROSNY, Leon de, b. France, 1837; educated at Paris. He attained a deep knowledge of philology, oriental languages, and kindred subjects, and in 1863 was interpreter to the Japanese embassy. In 1868 he became instructor in Japanese at the Paris school of oriental languages. M. Rosny is also the founder of the society of American and oriental ethnography. He has published many pamphlets and text books on subjects connected with his specialty.

ROSOLIC ACID, or Aurin, also called *corallin*, a red coloring matter used in dyeing, made by heating phenol (carbolic acid, q.v.) with oxalic and sulphuric acids. In this reaction the oxalic acid is resolved into carbonic acid (CO_2), carbonic oxide (CO), and water (H_2O). The carbonic oxide then reacts on the phenol as follows:

Phenol. Carbonic oxide. Rosolic acid. Water.

$$3C_6H_6O + 2CO = C_{20}H_{14}O_3 + 2H_2O.$$

To obtain a pure product, the mixture of sulphuric acid and phenol must be heated on a water bath, and the oxalic acid added gradually, not using enough to attack all the phenol. A commercial dye-stuff, known as aurin, corallin, or pæonin, which gives a fine yellow-red color to woolens and silks, is prepared in a similar manner. It is a mixture of several substances, but may be purified by treatment with aqua-ammonia, which dissolves the extraneous matters, leaving a residue of nearly pure aurin. The same compound is obtained by the action of nitrous acid on rosaniline; and it is reconverted into that base by heating with ammonia in an aqueous or alcoholic solution. Rosolic acid crystallizes from its alcoholic solution in red prisms with a green metallic luster. It is insoluble in water, soluble in alcohol, strong hydrochloric acid, and glacial acetic acid. It unites with sulphurous anhydride, forming garnet-colored crystals having the composition $4C_{20}H_{14}O_3,2SO_2+11H_2O$. By reduction with zinc dust in alcoholic solution, rosolic acid is converted into *leucaurin*, $C_{20}H_{16}O_3$, which crystallizes from alcohol in colorless prisms, and is reconverted into rosolic acid by oxidation.

ROSS, a Celtic word, meaning a headland, occurring as the name or part of the name of many places in the British Islands, and in other parts of Europe, as Roslin, Culross, Rossberg, Ross (in England), Montrose, Roxburgh, Ardrossan. There is another Welsh root, *rhos*, signifying a moor, which is found in Welsh and Cornish names, as Rossall, Rusholme. In Roseness, in Orkney, the equivalent Teutonic term *ness* has been superadded after the meaning of the Celtic *ross* had been lost.

ROSS, a co. in s. Ohio, watered by the Scioto river and Paint creek; on the Ohio and Erie canal, and the Marietta and Cincinnati railroad; 650 sq.m.; pop. '80, 40,307—37,745 of American birth. The surface is diversified. The soil is fertile. The principal productions are corn, wheat, oats tobacco, hay, and wool. There are carriage manufactories, flour mills, woolen mills, leather manufactories. Co. seat, Chillicothe.

ROSS, a thriving market t. in Herefordshire, is finely situated on the left bank of the Wye, 14 m. s.s.e. of Hereford. In the parish church (date 1316) is buried John Kyrle, celebrated by Pope as the "Man of Ross" (q.v.). The town is well furnished with schools, carries on a trade in cider, malt, and wool; is much visited by tourists, and contained (1871) 3,586 inhabitants.

ROSS, Alexander, 1699–1784; b. Scotland; educated at Marischal college; acted as tutor and school teacher in several places, and in 1732 settled as school-master at Lochlee, in Angus, where he remained until his death. He was all his life a writer of verses, but it was not until 1768 that he published his first book, *The Fortunate Shepherdess, a Pastoral Tale in the Scottish Dialect*, which has a humorous preface by Dr. James Beattie, and contains some songs still popular in Scotland.

ROSS, Alexander, 1742–1827; b. London; entered active service in the army as ensign in 1760; served in Germany with the allied army, attained the rank of capt. in the 45th, 1775; subsequently col. of the 59th and governor of Fort George. He served through the American war as capt. of grenadiers and aid-de-camp to lord Cornwallis; brevetted maj. 1781. He was one of the commission appointed by Cornwallis to arrange his surrender at Yorktown; and was adjutant in Scotland and in the East Indies, with the same commander-in-chief, and fought in every battle; promoted to gen. 1812. His son Charles edited and published the Cornwallis correspondence.

ROSS, Alexander Milton, b. Canada, 1832; studied medicine. He traveled over Canada, and made a complete collection of the birds of the Dominion, numbering 323 species. His entomological collection contains 10,000 specimens. He has published *Birds of Canada*, 1871; and *Butterflies and Moths of Canada*, 1872. He has made a large botanical collection.

ROSS, Charley, b. Germantown, Penn., 1870; his full name was Charles Brewster Ross, son of Christian K. Ross. On June 27, 29, 30, and July 1, 1874, the child was accosted, while playing in the streets of Germantown with his brother, by two men in a buggy, who on each occasion gave the two boys candy, and on the last took them for a drive, The elder boy was sent to buy fire-crackers on reaching Kingston, Philadelphia, and on returning to where he had left the buggy, he found it had disappeared, with his brother. He was picked up by a gentleman and returned to his home. From that time until the present writing (April, 1881) the boy Charley Ross has not been seen by his relatives, although the police and press of the country, and the entire American public, have been interested in the search for him. Anonymous letters to Mr. Ross indicated that the abduction was for the purpose of obtaining money; but though a reward of $20,000 was offered by the mayor of Philadelphia, and this amount was demanded by the abductors of the child, the latter was not given up. A long series of communications, by letter and through the personal columns of various newspapers, effected nothing—mainly because Mr. Ross was in the hands of advisers who induced him to persist in efforts to capture the abductors. These efforts were discerned by the latter, and rendered futile whenever made. On numerous occasions the boy was reported found, and the unhappy father traveled over many parts of the country, and inspected many homeless and friendless boys who bore some resemblance to his lost son, but always without success.

ROSS, George, 1730–79; b. Delaware; began the practice of law at Lancaster, Penn., in 1751. He was a member of the colonial assembly of Pennsylvania 1768–76, of the legislature which succeeded that body, and of the continental congress, 1774–77. He was appointed a judge of the court of admiralty in 1779.

ROSS, Sir James Clark, Arctic explorer (nephew of sir John), third son of George Ross, esq., of Balsarroch, Wigtonshire, was b. in London April 15, 1800. He entered the navy in his 12th year, and served under his uncle in the Baltic, the White sea, the coast of Scotland, and in all the naval expeditions for the discovery of the north-west passage (q.v.) from 1818 to 1833. It was while accompanying his uncle in his second Arctic voyage that he discovered, 1831, the n. magnetic pole, and on his return he was rewarded with a post-captaincy. Afterward employed by the admiralty in a magnetic survey of Great Britain and Ireland, he, in 1836, crossed the Atlantic to relieve the frozen whalers in Baffin's bay; and in 1839 he was placed in command of an expedition to the Antarctic seas (see POLAR EXPEDITIONS), and approached within 160 m. of the s. magnetic pole. On his return, in 1843, he received the honor of knighthood; and in 1847 he published his *Voyage of Discovery in Southern Seas*, 1839–43. In Jan., 1848, he made a voyage in the *Enterprise* to Baffin's bay, in search of sir John Franklin, but without success. He received the "Founder's gold medal" from the geographical society of London in 1841, the gold medal of the Paris society, and D.C.L. from Oxford in 1844. He died in 1862.

ROSS, Sir JOHN, C.B., Arctic voyager, b. June 24, 1777, at Balsarroch, Wigtonshire, was a son of the rev. Andrew Ross of Inch. He entered the navy at the early age of 10, was 15 years a midshipman, 7 years a lieut., 7 years a commander, and became a post-capt. in 1818. When lieut. of the *Surinam* he was wounded in cutting out a Spanish vessel from under the batteries of Bilbao, in 1806. During the war he was in three different actions. His more important services were rendered in the Arctic regions, whither, in 1818, he proceeded with sir W. E. Parry. See NORTH-WEST PASSAGE. He published the results of his investigations in 1819. In May, 1829, he was employed on a fresh expedition to the Arctic regions (fitted out at his own expense by sir Felix Booth), and discovered the peninsula of "Boothia Felix." Ross received, on his return, the honor of knighthood, and was made C.B. He received the freedom of London and other cities, gold medals from the geographical societies of London and Paris, was made a knight of various foreign orders, and received other acknowledgments of his services. In 1838 he was appointed British consul at Stockholm, where he remained some years. He was author of *Letters to Young Sea-officers; Residence in Arctic Regions*, etc. (1829–34), 4to; appendix to same, 4to; *Memoirs and Correspondence of Admiral Lord de Saumarez*, 2 vols. 8vo; *Treatise on Navigation by Steam*, 4to. He became a rear-admiral in 1851, and died Aug. 30, 1856, at his house in Gillingham street, Pimlico.

ROSS, JOHN, or KOOWESKOOWE, 1790–1866; b. Ga.; a half-breed, who received an English education, and was made chief of the Cherokees in 1828. In 1835, with more than 15,000 Cherokees, he protested to the president against the treaty between the United States and a part of the Cherokees, ceding their lands and agreeing to remove to the west. The treaty was, however, enforced by the government. Ross made a treaty with the confederate states in 1861.

ROSS, ROBERT, about 1770–1814: b. Ross Trevor, Devonshire, England; graduate of Trinity college, Dublin; served in the army with distinction in Holland and Egypt; was at Maida and at Corunna, under sir John Moore; brigade commander at Vittoria and the Pyrenees, under Wellington; wounded at Orthey. He came to this country, and in the war of 1812 defeated Washington's troops at Bladensburg, burned and pillaged the city of Washington in 1814, and was killed at North Point, Md., while marching on Baltimore.

ROSS, Sir WILLIAM CHARLES, 1794–1860; b. London; son of an artist. He became a student of the Royal academy, and when but 18 years old gained a prize from the society of arts, a success which he repeated for four years. In 1817 he became an assistant of Robertson, the noted miniature painter, and soon gained celebrity in that branch of the art. In 1837 he was appointed miniature painter to the queen, and in 1842 was knighted. He executed a few historical and fanciful pictures.

ROSS AND CROMARTY, treated of in the "Census of Scotland—1871," as one Scottish co., is, as such, bounded on the n. by Sutherlandshire, e. by the German ocean, s. by Inverness-shire, and w. by the Atlantic. Ross comprises the districts of Easter and Wester Ross, Ardmeanach, or the Black isle, and the island of Lewis (q.v.). Ross and Cromarty in many parts present a wild and mountainous aspect, intersected by beautiful glens, valleys, lakes, and rivers. Many of the mountains are of considerable altitude, the highest ranging from 3,000 to 4,000 ft., the most remarkable of which is Ben Wyvis. The high grounds afford excellent pasture for sheep and cattle, and the glens and low grounds, in the more favored portions, are generally of a superior soil, which, with the fine climate, especially in Easter Ross, produce grain of a superior quality. There are numerous fresh-water lakes and rivers. The principal loch is Maree (q.v.). There are several other lakes of considerable size, which, altogether, occupy an area of 90 sq. miles. There are numerous water-courses, the chief of which are the rivers Oikel and Conon, and several high waterfalls, the principal being Glomach, one of the finest in the kingdom. Limestone and ironstone are to be met with in abundance, as also granite and mica slate; and there are various mineral springs of note, the most famous of which is that of Strathpeffer. About the beginning of last century the country in many places was nearly devoid of trees, but soon after numerous plantations were formed, and many parts are now occupied by extensive forests. The lakes, rivers, and coast abound with fish, and the bays and sea-lochs being numerous, the fisheries are carried on extensively, occupying upward of 22,000 persons.

According to the census of 1871 the area of the two counties is 3,151 sq.m., or 2,016,375 statute acres. The valued rental in 1674 was £7,000; the valuation of 1875–76 (exclusive of railways) was £260,164. The total acreage under all kinds of crops, bare fallow, and grass, in 1876 was 124,826; under corn crops, 47,413, under green crops, 27,259; clover, sanfoin, and grasses under rotation, 29,987; the permanent pasture, exclusive of heath and mountain-land, was 19,395. The number of horses used for agricultural purposes was, in the same year, 7,099; the cattle counted 41,609; the sheep, 362,980; and the pigs, 6,407.

The population of the united shires in 1871 was 80,955. The parliamentary constituency, which returns one member to parliament, is 1580 in number. The chief towns are Dingwall (q.v.), Fortrose (q.v.), and Tain (q.v.).

ROSSANENSIS CODEX, a manuscript recently discovered at Rossano in southern Italy, containing all of Matthew and nearly all of Mark, written on purple parchment in double columns, in silver and gold uncial letters with no breathings, accents, or separation of words, and very little punctuation. The sections of Ammonius are marked in it. It is adorned with painted miniatures of scenes in the life of Christ, and heads of Old Testament prophets. Various criteria indicate that it was written not later than the beginning of the 6th century. The text resembles that of the only other purple manuscript, has some unique readings, and rather favors later codices where they differ from the Sinaitic and Vatican.

ROSSA'NO, a city of southern Italy, in the province of Cosenza, is situated at the foot of the Apennines, 2 m. from the gulf of Taranto, on a high, rocky hill, surrounded by steep precipices. It is walled and well built, is defended by a castle, and contains a beautiful cathedral, inlaid with carved marbles. Its fields are very fertile, producing grapes and lemons. Rossano was laid waste by Totila, king of the Goths. Pop. '72, 14,818.

ROSSBACH, a village in Prussian Saxony, in the government of Merseburg, and 8 m. s.w. of the city of that name, is celebrated in history for the victory here gained by the Prussians under Frederick the great over the combined French and imperialist armies on Nov. 5, 1757. A short time previously Frederick had been compelled to leave the bulk of his army in Silesia under the duke of Brunswick-Bevern to check the Austrians on this side, and hastened with 22,000 men to oppose the invasion from the west. The prince of Soubise (one of the "amateur" French generals of the period), who was at the head of the confederate army of 60,000 men, thinking from Frederick's cautious maneuvers that he was terrified and desirous of retreating, at once charged forward with his cavalry, and left his columns at the mercy of gen. Seidlitz, who attacked them in front and flank with the whole of the Prussian cavalry and artillery. The confederates were speedily thrown into utter disorder, and, being charged in front by the Prussian infantry under prince Henry, their rout was complete. The "rout of Rossbach" was so utterly disgraceful that it remained for a long time proverbial in the French army. The Prussians lost (according to a French account) only 300 men, while the loss of the allies was more than 1200 slain, 6,000 prisoners, among whom were 11 gens. and 300 officers, and 72 cannon, with many other trophies.

ROSSE, WILLIAM PARSONS, third Earl of, a well-known practical astronomer, was born in York in 1800, and educated first at Trinity college, Dublin, and afterward at Magdalen college, Oxford, where he graduated first-class in mathematics in 1822. During the life of his father he sat in the house of commons as lord Oxmantown, representing King's county from 1821 to 1831; he succeeded to the peerage in 1841, and was elected a representative peer for Ireland in 1845. At an early age Rosse had devoted much attention to the study of practical science, and especially to the improvement of the telescope, and had commenced as far back as 1826 to make experiments in the construction of fluid lenses (see *Philosophical Transactions* for 1840), but he subsequently relinquished those investigations, to engage himself with the problem of the best mode of constructing the speculum of the reflecting telescope. The two great defects which had hitherto baffled opticians were "spherical aberration" and absorption of light by specula; and in the casting of these of large size, there was the apparent impossibility of preventing cracking and warping of the surface on cooling. However, by a long series of carefully conducted experiments, he succeeded in discovering a mode of operation by which the last defect was wholly obviated, and the two others greatly diminished in amount. The metal for the speculum of his great telescope (see TELESCOPE), three tons' weight, was poured into the iron mold April, 1842, the crucibles being lifted and emptied by means of cranes; and the mold was kept in an annealing oven for 16 weeks, so that the metal should cool equably. It was then polished and mounted in his park at Parsonstown, at a cost of £30,000, the adjustments consisting of a system of chains, pulleys, and counterpoising weights, so complete in all its parts, that the ponderous instrument of 12 tons' weight can be moved so as to point in any direction, and with almost as much precision as the ordinary equatorial of the observatory. The first addition to the body of astronomical knowledge made by this telescope was the resolution of certain nebulæ, which had defied Herschel's instrument, into groups of stars; next came the discovery of numerous binary and trinary stars, and a description of the moon's surface. This telescope, constructed under Rosse's personal directions, is described in the *Philosophical Transactions*. He died in 1867, and a statue to his memory was erected in Parsonstown in 1876.

ROSSETTI, DANTÉ GABRIELE, son of Gabrielle, distinguished as a thoughtful and powerful painter, a graceful poet, and an elegant translator of early Italian poetry, was born in London in 1828, and educated at King's college, London. As a painter, he is more talked of than known, probably because his works are transferred into private collections as soon as they leave his studio, and without undergoing the publicity of exhibition. Although he has never exhibited at the "Royal academy," his pictures are occasionally sent by their proprietors to various public picture-galleries. Of these, his "Fair Rosamond," a picture pervaded by earnest thought, and treated in a powerful, though strikingly unconventional manner, was exhibited in the galleries of the Royal Scottish academy in 1860-61, and may be taken as a good example of the artist's manner. Of his other pictures, the chief are "Ecce Ancilla Domini," and "Beatrice Dead." He contributed some fine drawings to an illustrated edition of Tennyson, which, although inadequately engraved, rank among the first of modern wood-cuts. These, like everything this artist has produced, are strongly imbued with the spirit of the romantic period. Rossetti's name was first brought prominently forward by his association with Millais and Holman Hunt in the "preraphaelite brotherhood." In 1850 he was editor of *The Germ*, a magazine of poetry and art devoted to the furtherance of the views of the "brethren," and to the inculcation of their fundamental principle, which was direct study from nature herself, unfettered by the conventionalities of the "antique" and "academies." While time and experience have modified the practice of some of the original preraphaelites, Rossetti's pictures still display the peculiarities of earlier days. As an author, Rossetti is well known by his *Early Italian Poets from Ciullo d'Alcamo to Dante Alighieri* (1100-1200-1300) (Lond. Smith, Elder & Co., 1861). In this work the translator achieves the rare success of not only catching the spirit of Dante, but of rendering the great poet in his own meters, and with a marvelous fidelity of thought and phrase. In conjunction with his brother WILLIAM, he edited Gilchrist's *Life of William Blake, Pictor Ignotus* (Lond. 1833), left incomplete at the death of the compiler. *Poems* (1870) added to Rossetti's reputation.

Rossetti is not only a painter and author, but a man of thorough acquaintance with and high accomplishment in applied and decorative art. He has borne a distinguished part in the resuscitation of Gothic art in England, both ecclesiastical and domestic.—CHRISTINA ROSSETTI, sister of the above, and born 1830, has earned considerable literary reputation from her *Goblin Market and other Poems* (1862), *The Prince's Progress* (1866); *Speaking Likenesses* (1874), etc.—WILLIAM ROSSETTI has earned a name as an accomplished critical writer from his *Criticism on the Poems and Ballads of Swinburne* (1866), etc.—Another sister, MARIA (born 1827, died 1876), was known as the author of an able study of Dante.

ROSSETTI, GABRIELE, a celebrated Italian author, was b. at Vasto in 1783, and came to England as a political refugee in 1824. Two years afterward he published the *Comento Analitico* on the *Divina Commedia* of Dante, in which he aimed to show that in the middle ages all the poets used a jargon under which they veiled their hatred of the papacy, and concealed the true religion under the form of a woman beloved by them. In conducting this argument he displayed amazing erudition. His opinions naturally excited a great deal of hostile criticism. Rossetti replied to his opponents with the work, *Sullo Spirito Antipapale che Produsse la Riforma, e sulla Influenza che Esercitò nella Letteratura di tutta l'Europa e Principalmente d'Italia* (1830). But this book did not convince them either, and then Rossetti sought to reduce to method his system, and published *Il Mistero dell' Amor Platonico svelato* (1840), and *La Beatrice di Dante*. Whatever may be thought of Rossetti, he has at least founded a new school of interpretation of Dante, and his partisans are numerous in Italy. His name is well known in the peninsula for his national poems, which have gained for him the title of the Italian Tyrtæus. These are contained in the *Dio e l'Uomo* (1840); *Il Veggente in Solitudine* (1846); *L'Arpa Evangelica* (1852); *Poesie di Gabriele Rossetti* (1847). He was professor of Italian literature in King's college, London, and was honored and esteemed by many of the most eminent public men in England. He died in London in 1854.

ROSSI, GIOVANNI BATTISTA DE, b. Italy, 1822; studied archæology and early Christian inscriptions under father Marchi. He has given an account of his discoveries in his *Inscriptiones Christianæ Urbis Romæ septimo Seculo Antiquiores*, of which the first volume appeared in 1861, and which is a collection of the Christian inscriptions to the number of over 11,000. His researches in the catacombs are also the basis of his *Roma sotteranea Cristiana*. He has edited the *Bolletino di Archeologia*, and is a member of the Berlin academy of inscriptions.

ROSSI, PELLEGRINO, was b. of a noble family at Carrara in 1787. He carried on his studies at the university of Bologna. In 1812, being 25 years of age, he was appointed professor of law in that university. In 1815, king Murat having proclaimed Italian independence, Rossi sided with him. On the fall of Murat, Rossi was exiled. He took refuge at Geneva, where he was appointed professor of the science of law. There he published *Le Droit Pénal*, a very learned work, which made him famous in France. In 1833 Louis-Philippe called him to Paris, and appointed him professor of political economy. Then Rossi commenced the course *Du Droit Constitutionnel*, and the government, in order to reward the great publicist, naturalized him, and made him a member of the chamber of peers. Protected by Guizot, the prime-minister, Rossi was sent to Rome as ambassador in 1845. There he witnessed all the events of 1848 and took part in them, having again become an Italian subject after the fall of Louis-Philippe. When called to the ministry by Pius IX., Rossi wished to oppose the party favorable to the house of Savoy, and devised an alliance with the king of Naples, which had for its object a confederation of Italian princes with the pope as their president. This roused the hatred of the Romans, and Rossi was stabbed by an unknown hand on Nov. 15, 1848. In 1860 Luigi Carlo Farini decreed the publication of all the writings of Rossi, and that a bust of him should be given to the university of Bologna, where it was inaugurated with great solemnity on April 27, 1862. Besides the *Droit Pénal*, Rossi published the *Cours d'Economie Politique* (1840); the *Lettere d'un Dilettante Politico sull' Allemagna, sulla Francia, e sull' Italia* (Florence, 1848); and left many inedited writings, which, after his death, were published in Paris at the expense of the Italian government.

ROSSIE'NY, a t. of European Russia, in the government of Kovno, 66 m. n.w. from Kovno, on the Dubitza, a branch of the Niemen. Under the Polish government it was the capital of Samogitia. Pop. '67, 10,732.

ROSSI'NI, GIOACCHINO, the greatest composer of the present century for the Italian lyrical stage. He was born at Pesaro in 1792, the son of a horn-player in an orchestra of strolling players. At the age of fifteen the countess Perticari, discovering his talent, sent him to study at the lyceum of Bologna, where he received instructions in counterpoint from padre Mattei. He was, however, principally self-taught, giving days and nights to the study of the great Italian and German masters. Passing over a few juvenile efforts, his first important opera was *Tancredi*, which was performed in Venice in 1813, and excited an extraordinary sensation throughout the musical world, raising its composer at once to the summit of fame. It was followed in succession by *L'Italiana in Algeri* (1813), *Il Turco in Italia* (1814); and *Aureliano in Palmira* (1814); all inferior to *Tancredi*. In 1815 Rossini was appointed musical-director of the theater of San Carlo at Naples; and while holding that position he continued to produce operas both at Naples and elsewhere. *Il Barbiere di Seviglia*, the most popular of all his works, was produced at Rome in 1816, and said to have been composed in twenty days; it was followed by *Otello* in the same year; and in 1817 appeared *La Cenerentola* at Rome, and *La Gazza ladra* at Naples. From this time to the close of Rossini's engagement at Naples in 1823, he wrote the operas of *Mosè in Egitto, La Donna del Lago, Maometto Secondo* (otherwise known as *L'Assedio di Corinto*), and *Zelmira*. In 1823 he produced *Semiramide*, the most gorgeous of his operas, at Venice, and soon afterward left Italy. He first visited Paris, and then London, where he was received with great enthusiasm. Returning to Paris, he received from Charles X. the appointment of director of the Italian opera in Paris, and while there composed his *Guillaume Tell* (1826), which, though ill-constructed as a drama, ranks musically as high as any of his works. When the revolution of 1830 broke out, Rossini lost the management of the Italian opera, but continued to live for some time in Paris; in 1836 he returned to Italy, where, with the exception of a visit to Paris, he principally resided till 1855. With *Guillaume Tell* he may almost be said to have closed his career, having after it composed nothing of importance except his well-known *Stabat Mater*, a pretty and popular work more secular than sacred in its style of music. Large offers from the managers of opera houses did not succeed in tempting him from his retirement. His statue was inaugurated at Pesaro in 1864, amid a large concourse of Italian statesmen and men of letters. In Rossini's early works he developed with great felicity the type established by his Italian predecessors. These compositions are characterized by stirring melody, brilliant instrumentation, and a highly enjoyable vivacity. *Guillaume Tell*, though equally original, approaches far more nearly to the character of the German school. Much as Rossini's music continues to be prized, only four of his forty operas composed from 1810 to 1829 have kept the stage. *Il Barbiere, Otello, La Gazza ladra*, and *Semiramide*. He died Nov., 1868.

ROSSITER, THOMAS P., 1818–71; b. New Haven, Conn.; at an early age showed a taste for art. He studied with Jocelyn, a portrait painter of some note, and in 1838 began the painting of portraits as a profession. In 1840 he went to Rome and spent six years in study there and at other art centers of Europe. From 1853 to 1856 he was in Paris, and at the exposition of 1855 was awarded a gold medal. The latter part of his life was spent in Cold Spring on the Hudson. Besides many portraits he painted several historical and scriptural pictures. Among the best are "The Jews in Captivity;" "Miriam;" "Joan of Arc in Prison;" and "House of Washington."

ROSS, THE MAN OF, a name given by Pope to John Kyrle, an English gentleman of great benevolence, who was born at Whitehouse, Gloucestershire, in the first half of the 17th century. Kyrle received his appellation from having resided during the greater part of his life in the small town of Ross, Herefordshire. He there spent his time and fortune in building churches and hospitals, which procured for him the love and veneration of his contemporaries. Kyrle may be considered the Howard of his age; and Warton, in his *Essay on the Writings and Genius of Pope*, has stated that he deserved to be celebrated beyond any of the heroes of Pindar.

Pope, during his visits at the old mansion of Holm Lacy, the seat of viscount Scudamore, near Ross, heard so much of Kyrle's beneficence, that in his *Moral Essays* he celebrates his praises under the name of the Man of Ross:

> Behold the market-place with poor o'erspread!
> The Man of Ross divides the weekly bread:
> He feeds yon almshouse, neat, but void of state,
> Where age and want sit smiling at the gate:
> Him portioned maids, apprenticed orphans blessed,
> The young who labor, and the old who rest.

We learn further, from the same poem, that the fortune of Kyrle was no more than £500 a year. Kyrle died in 1724, and was buried in the church of Ross.

ROSSO ANTICO, the technical name for the red porphyry of Egypt. It consists of a red feldspathic base, in which are disseminated rose-colored crystals of oligoclase with some plates of hornblende, and grains of oxidized iron ore.

ROSTER (corrupted from register) is a fixed order preserved in military departments as the rotation in which individuals, companies, or larger bodies are called on to serve. Regiments proceed on foreign service according to the roster.

ROS'TOCK, the most important t. and seaport of the grand duchy of Mecklenburg-Schwerin, stands in a flat fruitful district on the Warnow, 9 m. from the mouth of that river in the Baltic, and 55 m. n.e. of Schwerin by railway. It is surrounded by ramparts and walls pierced by 12 gates, and has still a mediæval aspect. The university, founded in 1419, maintains 39 professors and lecturers, and has a library of 120,000 volumes. The handsome new university building is a renaissance structure in brick. In St. Mary's church, a large building dating from the 13th c., and possessing one of the finest organs in Germany, is the tomb of Grotius. St. Peter's, dating from the 12th c., has a tower 420 ft. high. There are several squares, of which Blücher's square contains a colossal monument of the gen. of that name. Manufactures of linen and tobacco, and tanning, brewing, and distilling are carried on. In the year 1866 the town of Rostock owned 377 vessels. The exports are chiefly wheat, barley, oil-cakes, and cattle-bones to Great Britain. The imports are coals, salt, iron, limestone, herrings and other provisions, timber, etc. At the mouth of the Warnow is Warnemünde, the port of Rostock, at which all vessels drawing more than 10 ft. load and unload. Pop. of Rostock '75, 34,172.—Rostock is of Slavic origin, and a shadowy glimpse of it is got in the 11th or 12th c., but the progress of commerce and other causes, chiefly political, rapidly Germanized it, and in 1218 it figures as wholly German. It was a member for centuries of the old Hanseatic league, long ranked in importance with Lübeck, and still enjoys to a wonderful extent its ancient privileges—the municipal constitution of the town being even yet almost wholly republican.

ROSTOF', a t. of European Russia, and one of the most ancient in the empire, in the government of Jaroslav, stands on the banks of lake Nero or Rostofsky. An important fair is held here, and a flourishing commerce, which the railway from Jaroslav to Moscow promises to increase, is carried on. Rostof contains numerous factories, the chief manufacture being that of linen. Pop. '67, 11,805.

ROSTOF-ON-THE-DON, a district t. and ferry of s. Russia, in the government of Ekaterinoslav, stands high on the right bank, and at the head of the delta of the Don. It owes its origin to the foundation of the fortress of St. Dmetri here in 1749, since which time the progress of the town, owing to its advantageous situation, has been so great that it is now the center of trade in s. Russia. Its custom-house was erected in 1835, and in that year the customs' dues amounted to £150,000. The annual exports have amounted to £1,198,526, the principal articles being wheat, iron, tallow, and linseed. Manufactures are carried on with activity in 22 factories, the principal articles produced being cast-iron, bricks, ropes, tobacco, macaroni, soap, and leather. Railway communication with Vladikaukas in Caucasia was opened in 1875. Pop. '67, 39,129.

ROSTOPCHINE, Feodor Vassilevitch, Count, a Russian gen., directly descended from Genghis Khan, was b. in the province of Orel, Mar. 23, 1765; and, after having filled for some time the office of page to Catharine II., entered the Russian military service as a lieut. in the imperial guard. In 1784 he set out on a course of foreign travel, returning to St. Petersburg in 1792, and obtaining, through the powerful influence of some friends, the post of gentleman-of-the-chamber. Having the good fortune to be the first messenger to Paul of his accession to the throne, he was immediately (1796) created gen., a rise in rank speedily followed by the successive appointments of grand-marshal of the court, minister of foreign affairs, count (1799), and chevalier of all the Russian orders. Rostopchine possessed extraordinary influence over the mind of the half-witted monarch, and succeeded in preventing his vagaries from seriously affecting the government or religion of the empire; but he was repeatedly banished from court and almost immediately recalled, and it was during the last of these banishments (to Moscow) that the czar was murdered. The emperor Alexander seems to have disliked him, for Rostopchine remained in a state of banishment till May, 1812, when, having need of the services of all his subjects, and knowing Rostopchine's distinguished patriotism, Alexander appointed him governor of Moscow. On the approach of the French Rostopchine, by extraordinary exertions, raised an army of 122,000 men fully equipped, but to his great chagrin was ordered to evacuate Moscow. Rostopchine has been unanimously branded by the French writers as the burner of Moscow, and for a long time this was generally credited in the west, till, in 1823, he published in his own defense, *La Vérité sur l'Incendie de Moscou* (Paris, 1823), in which he rebuts the charge, affirming that this barbarous action was due in part to the fervid patriotism of a few of the inhabitants, and in part to the violence and negligence of the French. At the same time he showed that the damage done to Moscow was much less than the estimate given by French and English writers, and that the Kremlin, which the French had attempted to blow up, had been in reality little injured. Rostopchine certainly set fire to his own mansion-house in the neighborhood, but no other act of incendiarism has been proved against him, the accusations published in the *British Monitor* (1822) having been triumphantly rebutted. He had succeeded in repairing much of the damage done to the city, and in re-collecting many of its former inhabitants, when, through a court intrigue, his dismissal from office was effected (August 30, 1814). Rostopchine accompanied the emperor Alexander to the congress of Vienna, and subsequently (1817) retired to Paris, where he occupied himself in literary pursuits, and in forming a fine collection of pictures and books. In 1825 he returned to Russia, and died Jan. 30, 1826, at Moscow. His wife and one of his sons have made for themselves names in literature, and his daughter-in-law, the countess EUDOXIA ROSTOPCHINE, is considered as one of the first poets of Russia. Rostopchine's works, which include a number of historical memoirs, comedies, etc., in Russian and French, were collected and published at St. Petersburg in 1853.

ROT is known in the south-western counties of England under the provincial names of bane, coa, or coathe. It consists in the maturation within the liver and biliary ducts of an entozoon, the *distoma hepaticum*, or fluke (q.v.). Although most frequent among sheep, it also occasionally attacks rabbits, hares, deer, and cattle. Until of late years, the annual losses amongst the flocks of Great Britain were estimated at a million; but in 1809, 1824, 1830, and 1833 this large mortality is believed to have been doubled. During the wet winter of 1852–53, and again in the autumn of 1860, and early months of 1861, rot was extensively prevalent. Autumn and early winter are the periods of its most frequent occurrence. Close damp weather, inducing a rapid growth of soft, luxuriant herbage, favors its development. The rising of the Nile is said to rot annually 16,000 sheep. Low, damp, marshy situations, water-meadows, undrained lands, especially when of a clayey, retentive consistence, furnish a large proportion of cases. The hay from such localities induces rot almost as readily as the fresh grass. Sheep grazed even for a few hours upon land subject to rot, or taking a single draught from an infected stagnant pool, may contract the disorder, most probably by swallowing the young flukes. From 15 to 40 days usually elapse before any serious consequences follow from the presence of the parasite. At first, indeed, digestion appears to be stimulated, and the sheep thrive rather better than before; but by and by they rapidly waste, their wool becomes dry, and easily detached, their bowels irregular, their skin and mucous membranes yellow, as is usually conveniently observed by examining the eye and its pearly caruncle, which in rot loses the brilliancy of health, and exhibits a dingy yellow hue. The body, after death, is soft, flaccid, and indifferently nourished; watery effusions are discovered underneath the jaws and in other dependent parts; the small quantities of unabsorbed fat have a dirty yellow color; the liver is soft and enlarged, and usually mottled with patches of congestion. In the thick and muddy bile, the flukes, with their myriads of spawn, float in variable numbers.

The treatment of rot is seldom very satisfactory; and if the animals, when first affected, are in tolerable condition, no time should be lost in having them slaughtered. If remedial measures are attempted, the sheep should be removed to a dry and sound situation, and liberally supplied with dry nutritive food. During the summer allow corn or cake with the grass; during the winter, when cases are most frequent, supply clover-hay, peas, or split beans, a little bruised linseed cake, and a few roots: pieces of rock-salt should also be laid about the ground for the patients to lick at. Medicines are seldom of much avail. Those most to be relied on are turpentine and powdered gentian in two-dram doses, given daily, beat up with an egg and a little milk, or with some linseed gruel. The turpentine, besides acting beneficially as a stimulant, doubtless also exercises a poisonous action on the flukes, whilst the gentian imparts tone to the irritable and relaxed bowels. The prevention of rot is usually effected by removing from the land all superfluous moisture by deep and thorough drainage. The improvement of unsound herbage may subsequently be expedited by dressings of lime, salt, soil, or composts of farm-yard manure and earth. On all suspicious grazings, beans and oats should for a time be given in moderate quantity, and access allowed to rock-salt. The Arab and Bedouin shepherds have for centuries recognized the importance of such measures, for, when their flocks became rotten from depasturing on the rank herbage that shoots up after the rising of the Nile, they often prevent serious loss by promptly transferring them to the desert, where the dry forage-plants are very rich in saline matters. The Australian flock-master likewise checks the complaint by promptly removing his sheep which have become tainted from the deep alluvial soils to the poorer upland "salt-brash" countries. In like manner, the salt marshes of Cheshire, and the saltings left along our coasts by the tides, have long enjoyed a well-deserved celebrity in the prevention, and even in early cases in the cure, of sheep-rot.

RO'TA, a t. of Spain, in the province of Cadiz, and 6 m. n.n.w. from Cadiz, on the opposite side of the entrance of Cadiz bay. Rota wine has acquired some celebrity, and is brought to the British market. Pop. 8,000.

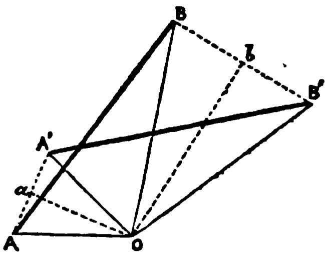
ROTANG. See RATTAN.

ROTA'TION (Lat. *rota*). There is, perhaps, no elementary idea which has been the subject of so much popular misconception as that of rotation. This is probably due to the vagueness of the definitions commonly given.

All motion that we can observe is *relative;* for instance, any fixed object on the earth's surface has a certain motion *relative* to the earth's axis, in consequence of the diurnal rotation; the earth itself has a certain motion *relative* to the sun, in consequence of its annual revolution; the sun has a certain motion *relative* to the so-called fixed stars; and it is possible that the whole stellar system may have a motion *relative* to something in space beyond its boundaries. Now, the motion of an object on the earth's surface differs according to the way it is measured: a passenger sitting in a railway carriage is *at rest* if his motion *relative* to the carriage be considered; he has the same motion as the carriage if it be measured *relative* to the rails; and if the carriage were running from e. to w. along a parallel of latitude, so as to complete the circuit in 24 hours, he would be at rest relative to the earth's axis. If, therefore, we wish to talk of *absolute* motion, it must be measured *relative* to FIXED points or directions; and in the violation of this obvious condition lies the error most commonly met with. Thus, to show that the earth rotates about its axis, we may observe its motion relatively to the line joining it with the moon; and we observe that the moon comes to the meridian at intervals of (roughly) 25 hours. Does the earth rotate in 25 hours? We know that it does not, and the error consists in treating as an *absolute* rotation, a rotation measured relative to a line—that joining the earth and moon—which is itself turning. If we take the intervals of the sun's crossing the meridian, we find 24 hours—a much closer approximation; but still not exact, because our line of reference—that joining the earth and sun—is slowly turning. Would we have an absolute measure, we must choose a *fixed* line, or one so nearly fixed that its motion is absolutely insensible. Such is the line joining any fixed star with the earth, and the time of the earth's *absolute* rotation about its axis is $23^h\ 56^m\ 4.09^s$—the interval between culminations of the same fixed star. The difference between absolute and relative rotation in any planet gives rise to the difference between the *sidereal* and the *solar* day; and the planet's year contains just *one* more of the former than of the latter.

Now, suppose for a moment that the earth were to revolve only $\frac{1}{366}$ part as fast as it now does, there would be *one sidereal* day in the year, and there would be *no* solar day at all—in other words, there would be *no* rotation of the earth with reference to the line joining it with the sun; that is, the earth would turn always the same side to the sun; yet it would be *absolutely* rotating about its axis once in a year. This is the case which we observe in the moon's motion relative to the earth, and we see at once that the moon must rotate *absolutely*—that is, with reference to fixed directions in space—in the exact time in which she completes one revolution about the earth. Those who say the moon does not rotate on her axis make precisely the same mistake as those who fancied that the earth is immovable, and that moon, sun, and stars revolve about it every day. There is a physical cause for this peculiarity in the moon's motion, which leads to very important consequences with reference to the future of the solar system. See TIDES.

Several elementary theorems regarding rotation may now be enunciated; but the proofs, though very simple, will be given merely in outline. Any displacement *whatever* given to a plane figure in its own plane—as to a sheet of paper lying on a table—is equivalent to a single rotation about a definite axis. Let A, B be any two points of the figure, and let them be displaced to A', B' respectively. Join AA', BB', and bisect them in *a* and *b* by perpendiculars meeting in O. Then, it is easy to show that (1.) OA' = OA, OB' = OB, and therefore O is the *same* point of the plane figure in its first and second positions. (2.) ∠ AOA' = ∠ BOB', and is therefore the angle through which the whole has turned about the point O. If AA' and BB' are parallel, this construction fails; but in this case, if AB and A'B' do *not* intersect, the motion is simply one of translation: if they *do* intersect, the point of intersection is the axis.



Any number of successive rotations about different points constitute, of course, a displacement, and are therefore reducible to one rotation.

Two equal and opposite rotations about different points give rise to a mere translation.

The first two of these propositions are true of figures on a sphere as well as on a plane surface; for the figure above has only to be drawn with great circles instead of straight lines, and the proof applies letter for letter. Only, here, the first case of exception cannot occur, because two great circles *must* intersect. Hence it follows that if the center of a sphere be fixed, any displacement whatever is equivalent to a rotation about some axis; that is, after any motion whatever of a rigid body, one point of which is fixed, there is always *one* line of particles which remains undisturbed. [This simple proposition has been found very hard to believe, even by men of considerable intelligence.] Hence rotations about any number of axes passing through the same fixed point may be compounded into one; and, generally, any motion whatever of a rigid body may be decomposed into two, one of which is a motion of translation of some chosen point, and the other rotation about some axis through that point. Thus, in the case of the moon, we have a motion of translation of its center in its orbit, and one of rotation about its axis; or we may combine them into a single rotation in the period of a lunar month about a fixed axis passing through the earth's center.

Again, any displacement of a plane figure in its plane, or of a spherical figure on a sphere, may be produced by the rolling of a curve fixed in the figure upon another fixed on the plane or sphere. Hence, the most general motion of a body with reference to one point, consists in the rolling of a cone fixed in the body upon another fixed in space, their vertices being at the chosen point. To this, when the cones in question are right circular cones, belong the *precession* (q.v.) and *nutation* (q.v.) of the earth and of a top, the evolutions of an ill-thrown quoit, etc.

ROTA'TION OF CROPS. The plants, like the animals of the farm, differ much in their habits, and in the different sorts of food on which they subsist. The broad-leafed clovers, turnips, and mangold abstract from the air a large proportion of the materials of their growth; whilst the narrower-leafed grains and grasses, especially if their seeds are ripened, partake more largely of mineral food withdrawn from the soil. The cereals require for their healthy nutrition large supplies of phosphoric acid and silica; leguminous plants devour a large share of lime; turnips, carrots, and clover take up a great amount of potash. Corn-crops, occupying the ground during the greater part of the year, favor the growth of weeds; well-tended root-crops, on the other hand, afford better opportunity for deep culture, for the extirpation of weeds, for the convenient application of manures; whilst, being in great part consumed on the land, they raise its fertility. Mainly from such considerations, the farmer of arable land is led to grow a succession of dissimilar plants, or, in other words, to adopt a rotation of crops. The cereals exhausting the farm, on account of their ripened seeds being sold off, are generally alternated with fallow, root, or cleansing crops, or with beans and peas, which occupy a kind of intermediate position between the cereals and the roots; while clovers or grasses are taken at intervals of six or eight years. The rotation most suitable for a particular farm is, however, greatly modified by various circumstances, and especially by the nature of the soil, climate, markets, available supplies of extra manures, amount of live stock kept, etc. That course of cropping is evidently the most desirable which will economically secure, with thorough cleanness of the soil, a high and increasing state of fertility.

Many rotations are based upon the Norfolk or four-course system, which consists of (1) Clover or mixed grass seeds; (2) Wheat, or in many parts of Scotland, oats; (3) Turnips, Swedes, mangold, potatoes, or bare fallow; (4) Barley. The details of this system are generally as follows: The clovers or grasses are mown or grazed; when cut, they are either used green or are dried for hay; the second crop is carted home for the cattle or horses; near towns, it is sold off; or it is consumed on the ground in racks by sheep, which on most highly cultivated farms receive besides a daily allowance of cake or corn. In districts where town-manure can be obtained, a top dressing is applied as soon as the first crop of grass is cut. On the poor and worse cultivated soils, the grass-crop occasionally remains down for two, or even three years, thus extending a four into a five or six years' rotation. The clovers or mixed seeds are plowed up in autumn, and followed generally in England by wheat, and in Scotland by oats. These crops are now usually drilled, to admit of horse and hand hoeing. After harvest, the stubble is, if possible, cleaned by the scarifier, grubber, or plow and harrows; or, where the management for several years has been good, any patches of couch-grass or other weeds are best forked out by hand. The land, especially if heavy, or intended for mangold drilled on the flat, as practiced in the drier parts of England, may then be manured and deeply plowed the grubber and harrows, in April or May, suffice to prepare for the drilling of mangold or Swedes. Heavy land, intended either for roots or barley, should in spring be plowed or disturbed as little as possible. In Scotland, and the cooler moist climates of the north and west of England, turnips and potatoes are grown on raised drills or balks, in which the manure lies immediately underneath the plant. Frequent horse and hand hoeings should insure the thorough cleaning of the crop. Unless in the neighborhood of towns, where it is greatly more profitable to sell off the whole of the root-crop, part of the Swedes or mangold is taken home for the cattle, but the largest portion is consumed by sheep in the field. After the fallow or cleaning crop, another cereal crop is grown: under the Norfolk system, this is generally barley, with which the clovers or seeds are sown out. Where sewage or tank water is available, Italian rye-grass is often used, and on land in high condition, early large and repeated cuttings are obtained; but rye-grass has the disadvantage of being a wrsoe preparation than clover for the wheat-crop which usually follows. The chief failing of the four-course system consists in the frequent recurrence of clover, which cannot be successfully grown oftener than once in six or eight years. To obviate this difficulty, one-half of the clover quarter is now often put under beans, peas, or vetches, thus keeping the grass or clover seeds eight years apart.

The Norfolk four-course system is unsuitable for heavy land, where a large breadth of roots cannot be profitably grown, and where their place, as a cleaning crop, is taken by bare fallow, vetches, or pulse. Bare fallows are, however, less frequent than forn, erly, being now confined to the most refractory of clays, or to subjects that are so hopelessly fully of weeds as to require for their extirpation several weeks of summer weather- and the repeated use of the steam or horse plows, the scarifier, grubber, and harrows. In such circumstances, winter vetches are often put in during September or October, are eaten off by sheep and horses in June or July, and the land afterward cleaned: this practice is extensively pursued on the heavier lands in the midland and southern counties of England. In such localities the following system is approved of: (1) The clover leas are seeded with (2) wheat; then come (3) beans, pulse, or vetches, manured, horse or hand hoed; (4) On good land, wheat succeeds; (5) Oats or barley often follow, but to prevent undue exhaustion of plant-food, this system requires considerable outlay in artificial manures, cake, and corn; (6) A fallow, or fallow crop, deeply and thoroughly cultivated, and well manured, comes to restore cleanness and fertility; (7) Barley or wheat is drilled, and amongst this, the clover-seeds are sown. On the heavier carselands in Scotland the following plan of cropping is generally practiced: (1) Clover; (2) Oats; (3) Beans; (4) Wheat; (5) Bare fallow or fallow crop, usually including a considerable breadth of potatoes; (6) Wheat; (7) Barley, with which the clovers or mixed grasses are sown. Under this system it is difficult, with so few cleaning crops, to keep the land clean; roots, besides, are not produced in quantities sufficient properly to supply either cattle or sheep during the winter. To remedy these defects, roots may be introduced after the oats, and would be followed either by wheat or barley. This extends the rotation from seven to nine years.

In all well-cultivated districts, whether of heavy or light land, stock-farming is extending, and a more vigorous effort is being made to raise the fertility of the land. Root-crops are accordingly more largely grown; indeed, it is sometimes found profitable to grow two root-crops consecutively; thus, after turnips, Swedes, cabbage, or mangold, well manured from the town or farmyard, and eaten off by sheep, potatoes of superior quality are produced with one plowing, and a dose of portable manure. Specialties of management occur in almost every locality. In Essex, winter-beans follow wheat, are got off in August, and are succeeded by common turnips. Near London, and in other southern districts, early potatoes or peas are grown for market, and are immediately followed by turnips. In many parts of England, where the soil and climate are good, rye or vetches sown in autumn are consumed in early summer, and a root-crop then put in.

Good rotations do not necessarily insure good farming; they are merely means to an end. By carefully removing weeds, by deeply stirring the soil, and by applying appropriate manures, wheat may be grown on the same soil for an indefinite number of years. At Lois-Weedon, in Northamptonshire, the rev. S. Smith has for 20 years cultivated alternate three-foot strips of wheat and well-forked bare fallow; the land that is wheat this year being fallowed next. Although no manure whatever is applied, and only one-half of the experimental plot is each year under crop, the yield continues to stand at four quarters per acre, which is about four bushels per acre in excess of the average acreable produce of Great Britain. The Lois-Weedon system, owing to the outlay which it entails for manual labor, probably could not be carried out with profit on a large scale. It demonstrates, however, the inherent resources lying dormant, especially in clay soils, and indicates how they may be rendered available by thorough cultivation. It is mainly by such cultivation that steam-power proves so serviceable in our fields. The soil is turned up deeply to the disintegrating solvent influences of wind and weather; the necessary operations are rapidly overtaken in good season; much work is accomplished in autumn; treading and poaching of the surface is avoided; while a larger breadth of roots is attainable for the healthy and economical support of the sheep and cattle stock, which not only directly enhance the returns of the farm, but also raise rapidly its manurial condition.

As agricultural education and enterprise extend, fixed rotations will be less regarded. The market gardener, who extracts a great deal more from his land than the farmer has hitherto been able to do, does not adhere to any definite system of cropping. If the farm is kept clean and in improving condition, there can be no harm in growing whatever crops it is adapted to produce. Cropping clauses are only requisite during the three or four last years of a tenancy. The restrictions found in some agreements preventing the growth of clover for seed, flax, and even potatoes, are inadmissible. Equally objectionable are clauses against the sale of particular sorts of produce, such as hay or roots. The farmer, if he is fit to be intrusted with the use of the land, ought to be permitted to grow or sell off any crop he pleases, provided an equivalent in manure be brought back. On well-cultivated land, in good condition, it is now the practice of the best farmers to take oats or barley after wheat; indeed, some of the best malting barley in Essex, on the Scottish-carse lands, and elsewhere, is now grown after wheat. The frequent growth of cereals, and the heaviest of hay and root crops, even when removed from the farm, may be fairly compensated for by large doses of town-dung or of sewage. The plant-food disposed of in the more ordinary sales of the farm is economically restored by the use of bones or superphosphate, guano, or nitrate of soda, or by keeping plenty of sheep, penning them over the land, and supplying them liberally with cake and corn.

ROTATION, MAGNETISM OF. This was discovered by Arago in the years 1824–25. He observed that when a magnetic needle was made to oscillate immediately above a copper plate, it came sooner to rest than it did otherwise. The oscillations were made in the same time as when away from the plate, but they were less in extent; the plate seemed thus to act as a damper to the motions of the needle. This being the action of the plate at rest on the needle in motion, Arago reasoned that the needle at rest would be influenced by the plate in motion. Experiment confirmed his opinion. He made a copper disk revolve with great rapidity under a needle, resting on a bladder placed immediately above it, and quite unconnected with it, the middle of the needle being placed above the center of the disk. As expected, the needle deflected in the direction of the motion of the disk. The deflection of the needle increased with the rapidity of the motion, and when it reached a sufficient amount, the needle no longer remained in a fixed position, but turned round after the disk. This action of the revolving disk was attributed to what was then called the "magnetism of rotation," and the name has since been retained.

The explanation of this phenomenon was first made by Faraday (1832). He found it to arise from the reaction of currents, induced in the plate in motion by the magnet. The accompanying figure illustrates the electrical condition of the plate. PP is the plate, rotating in the direction indicated by the arrow; NS is the needle; and the lines with the arrow-heads indicate the general direction of the currents induced by rotation under the magnet in the plate. There are two complete circuits on each side of the disk, coinciding in the middle, and taking the direction CC. It is the conjoined current which affects the needle; it runs in a direction a little in advance of the needle, as the inductive power of the magnet takes some time to act. As the induced current lies below the needle, the deflection (according to Ampere's rule, see GALVANISM) takes place in the direction of the motion of the disk. When cuts are made in the disk in the line of the radii, it loses almost entirely its disturbing power; the currents formed in the whole disk can no longer take place, and those formed in the various sectors are weak in comparison; by filling up the vacant spaces with solder, the power is nearly restored to it. As is to be expected, the effect of the revolving plate depends on the conducting power of the material of which it is made. It is owing to its high conducting power that copper is so much used in these experiments; hence, also, it is that copper should be so much used in the construction of magnetic apparatus. A copper compass-box, for instance, is not only desirable, from its being free from iron, but it acts as a damper to bring the needle quickly to rest when disturbed.

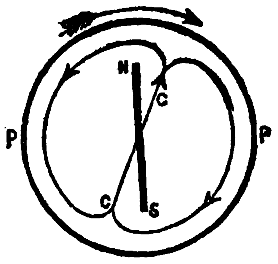


FIG. 1.

The magnetism of rotation is only one of a large class of phenomena in which the motion, either of a magnet or of a conductor near it, induces an electric current in the conductor. We may here quote two experiments which may be looked upon as the converse of the magnetism of rotation. In the first experiment, a small cube of copper is hung by a thread to a frame, and placed between the poles of a powerful electro-magnet; the cube is sent into rapid rotation by the twist on the thread, previously given it; it is instantly brought to a halt, when the current is allowed to circulate in the coils of the magnet, and it begins its motion again when the current is turned off. In the second experiment, a disk of copper is made to rotate rapidly between the poles of an electro-magnet, by means of a handle and intervening wheel-works turned by the experimenter. When the current invests the soft iron poles with magnetism, the disk, moving freely before, appears suddenly to meet with an unseen resistance, and the rotation continues slowly or not at all. If persisted in, the rotation causes the disk to rise in temperature, the rise being proportionate, acccording to Foucault, to the square of the velocity of rotation. These and all similar phenomena illustrate a law that holds universally in magnetic induction, and was first enunciated by Lenz: *When a current is induced by the motion of a magnet or conductor, the inductive action tends to develop in the conductor a current in such a direction that its action will be to oppose the motion producing it.* Thus, in the last experiment, the part of the disk approaching the poles has a current developed in it which repels them, and the part leaving the poles, has a current induced in it which attracts them. The approach of the one part and the departure of the other are equally opposed by the currents induced in them. The same mode of explanation applies to the other experiments referred to.

ROTATO'RIA, or ROTIFERA, popularly known as WHEEL-ANIMALCULES, derive their name from the Latin word *rota*, a wheel. They have received these names on account of the apparent rotation of certain disk-like ciliated organs which surround the mouth. Although some of the larger forms may be detected with the naked eye, they are as a class microscopical. They are widely diffused over the surface of the earth, inhabiting both salt and fresh water, and occurring in all climates. There has been much discussion as to their true place in nature. Ehrenberg regarded them as infusoria, and Dujardin adopted a similar view. There is, however, no doubt that their organization is far more complex than that of the infusoria, and the main question of dispute at the present day is whether they are most closely allied to the worms or to the crustaceans. Huxley maintains that they form a link connecting the echinoderms with the nematoid (or thread) worms, and that they constitute the lowest step of the echinoderm division of the annelida; while Leydig endeavors to show that on various anatomical, physiological, and embryological grounds they more nearly resemble crustaceans than worms, and proposes to call them *ciliated crustaceans*. Science is indebted to Leeuwenhoek for the discovery of this remarkable class of animals. In the *Philosophical Transactions* for 1702 he described one of the commonest of these animals, now known as *rotifer vulgaris*, his attention having been especially directed toward its power of retaining its vitality after more or less complete desiccation—a fact which has been since confirmed by many other observers, and which is noticed in the article on DORMANT VITALITY. The rotatoria have usually an elongated form, and are in most cases covered with a smooth hard skin, which is thrown into folds by the contractions of the subcutaneous tissue. The animal consists of a head and body. The body usually terminates in a prolongation which, till recently, was termed the tail, but which is now known as the foot, and into which the intestines are never prolonged. The foot is composed of muscular and glandular structures, and often terminates in a pair of forceps, by which the animal can attach itself to leaves, etc. The body generally presents six segments, which are more or less distinctly marked in different genera. The head presents the characteristic rotatory organs and the mouth, which always lies in the midst of them, so as to receive particles drawn in by their whirlpool action. It is by means of these organs that they swim freely about, revolving on their axis, or when at rest producing vortex-like disturbances of the water. The form, number, and arrangement of these organs varies extremely in different genera, and has been made a basis of classification by Ehrenberg and others. The rotatory organ may be single, double, or multiple. It often consists of a disk supported by a pedicel, on whose borders are successive rows of regularly arranged cilia, the motion of which gives the appearance of rotation to the disk itself. In the genera *floscularia* and *stephanoceros* these organs undergo peculiar modifications. In the former there are five or six button-like processes about the mouth, covered with very long bristles, which move feebly and scarcely give rise to vortices; while in the latter the rotatory apparatus consists of five tentacle-like ciliated processes, and the animal thus closely resembles the polyzoa (q.v.). The ciliated rotatory organs, unlike ordinary volatile cilia, are entirely under the animal's control. The digestive apparatus differs extremely in the two sexes, which are always distinct in these animals. In the female the digestive apparatus is well developed, consisting of a mouth opening into a muscular pharynx, which has two horny masticating organs which move laterally upon each other. The pharyngeal masticating apparatus is of a roundish form, and is composed of two jaws having one or several teeth, which are brought together laterally by the action of special muscles. For further information on the subject the reader is referred to a very exhaustive memoir by Mr. Gosse, "On the Structure, Functions, and Homologies of the Manducatory Organs of the Class Rotifera," in the *Philosophical Transactions* for 1856. Succeeding the pharynx is a narrow esophagus, which leads into a dilated stomach, from which proceeds an intestine, which opens externally by an anus. In all the males that have been hitherto discovered there is an entire absence of digestive organs, a rudimentary pharynx being the most that is ever observed. The nervous system in the rotatoria consists of a cerebral ganglion, with filaments radiating from it. No heart or vessels have been discovered but the respiratory organs are well developed. The sexual organs of the female are better known than those of the male. The ovary is round or oval, usually lies by the side of the stomach, and the oviduct proceeding from it usually opens into the cloaca. The ovaries only develop a few eggs at a time, and the nearly mature eggs may be readily observed in the body of the animal when examined under the microscope. These animals produce two distinct kinds of eggs, which are similar in their primary formation, but which differ in their ultimate destiny—namely, thin-shelled summer eggs and thick-shelled winter eggs. The young are liberated from the former immediately after their discharge, while they remain unhatched in the latter during the winter weather. As far as has hitherto been observed, the males, which are much fewer in number than the females, are developed only from summer eggs. Except in regard to their being totally devoid of a stomach or intestine, and in relation to the sexual organs (which in the male have been carefully examined by Mr. Gosse in his memoir On the Diœcious Character of the Rotifera," in the *Philosophical Transactions* for 1857), the organization of the males is similar to that of the females. The sexes are, however, so unlike that they would be taken for widely remote genera if their actual hatching had not been observed; the males and the eggs from which they spring being much smaller than the females and the eggs from which they are produced. (In *brachionus amphiceros*, the female eggs were $\frac{1}{170}$ in. in length, while the male eggs were only $\frac{1}{307}$). The length of a female *brachionus dorcas* an hour after birth was $\frac{1}{95}$ in., while the diameters of the empty shell were only $\frac{1}{175} \times \frac{1}{220}$ in.—a marvelous increase in so short a period. "Whether," says Mr. Gosse, "certain individuals produce only male and others only female young, or whether separate impregnations are required for the production of the separate sexes, I do not know; but from all my observations I gather that the development of the one sex never takes places coetaneously with that of the other; for male and female eggs are never seen attached to the same parent, and the immature eggs in the ovary invariably develop themselves into the same sex as those which are already extruded. The duration of life in the male is always very brief; I have never been able to preserve one alive for twenty-four hours. Their one business is to impregnate the females, and for this momentary occupation no supply of loss by assimilation of food is wanted, and hence we can understand the lack of the nutritive organism."

ROTCHE *Mergulus* or *Cephus*, a genus of the auk family (*alcadæ*), separated from the true auks, on account of the thick, short, and indistinctly grooved bill. The COMMON ROTCHE (*M.* or *C. melanoleucus*, or *M. alle*, formerly *alca alle*), known also as the LITTLE AUK, SEA DOVE, DOVEKIE, and GREENLAND DOVE, is about the size of a large pigeon; its general color is black, but the belly is white, and there is a white mark upon each wing. It is very abundant in the arctic seas, and immense flocks are seen on the coasts of Greenland, Spitzbergen, Melville island, etc. It is, however, truly oceanic in its habits, and scarcely visits the land except during the breeding season. Though comparatively rare on the British coast, it is pretty frequently seen in the Orkneys.

ROTHE, RICHARD, one of the first speculative divines of Germany, was b. at Posen in 1799, and became successively member, professor, director, and ephorus of the theological seminary of Wittenberg. In 1837 he was nominated professor of theology at the university of Heidelberg, which in 1849 he exchanged for Posen. In 1854, however, he removed again to Heidelberg. Vigorous grasp and independence of thought were his chief characteristics, but he never formed a school, in the strict sense of the term. One of his well-known works is the *System of Theological Ethics, or Moral Theology*—a complete system of speculative theology or theosophy. This work is to show that religious truth is not a series of disputable propositions, but a divine morality; in a word, to translate the scholastic dialect of the creeds back into the living language of the Sermon on the Mount. Another remarkable book of his is the *Beginnings of the Christian Church*, which, by the peculiarity of "stand-point" assumed by the author regarding church and state, evoked many fierce counter treatises, like Baur's *On the Origin of Episcopacy*. Rothe died at Heidelberg in 1867. His lectures on *Dogmatik* were published in 1870; *Sermons*, in 1872; and *Quiet Hours* (*Stille Stunden*), the same year.

RO'THENBURG AN DER TAU'BER, a small ancient t. of Bavaria, on the Tauber, 31 m. s.s.e of Würzburg. Pop. '75, 5,772, who manufacture woolen cloth, paper, and gunpowder, and trade in corn and cattle.

ROTH'ERHAM, a market-town in the West Riding of Yorkshire, 6 m. e.n.e. of Sheffield, is situated on the slope of a hill on the right bank of the Don, immediately below the junction of that river with the Rother. On the middle of the ancient stone bridge that crosses the Don is a Gothic chapel formerly used as a prison. The Free Grammar-school, founded in 1584 and restored in 1858, and the court-house are handsome buildings. In the neighborhood are numerous coal and iron mines, which furnish materials for the manufactures, the chief of which are stoves, grates, nails, and engines. Pop. '72, 25,892. The union poorhouse, completed in 1839, is a spacious structure, capable of holding 314 inmates. The union comprises 27 townships or parishes.

In the vicinity of Rotherham are Roche abbey, erected in 1147, the masonry of which is still in a perfect state, and Conisborough castle, a massive ancient stronghold, which is still in a good state of preservation, but which will survive its natural decay in Scott's *Ivanhoe*.

ROTH'ERMEL, PETER F., b. Penn. 1817; studied land-surveying, afterward painting. He began to paint portraits about 1840. He made a continental tour 1856–57. During this time he painted his "St. Agnes," now at St. Petersburg. His best-known works are "Patrick Henry before the House of Burgesses;" "De Soto discovering the Mississippi;" "Christian Martyrs in the Colosseum;" "Columbus before Isabella the Catholic;" and "The Battle of Gettysburg."

ROTHE'SAY, a royal burgh, seaport, and favorite watering-place of Scotland, capital of the county of Bute, is beautifully situated on the n.e. shore of the island of that name, at the head of a deep bay, 40 m. w. of Glasgow by the river Clyde. The bay offers safe anchorage in any wind, and is spacious enough to contain the largest fleet. Owing to its numerous excellent schools and seminaries, hotels, shops, and warehouses, Rothesay presents all the advantages of a town, while the beautiful bay and the charming scenery of the island render it a favorite resort for sea-bathing and summer residence. The sheltered position and the extreme mildness of the climate have made it the resort of large numbers of invalids, especially such as are affected with pulmonary disease. Fishing is the employment of a number of the inhabitants, and ship-building is carried on to a small extent, and at the pier nearly all the Clyde steamers to and from the West Highlands regularly touch. The harbor is commodious and solidly built. Pop. '71, 7,800, which increases indefinitely during the bathing season. Within recent years, a very handsome promenade has been constructed. There is an excellent hydropathic establishment, and also an aquarium. In the middle of the town are the ruins of Rothesay castle, which first receives historical mention in 1263. It has remained in ruins since 1685. The marquis of Bute has done a great deal to render this ruin a picturesque object to visit, and has cleared away some of the old houses which were too near it.

ROTHSCHILD, MEYER ANSELM, baron of the Austrian empire, was b. in the Jews' Alley, Frankfort-on-the-Main, in 1743, and d. in 1812. He was brought up to be a priest of the Hebrew faith. Being a man of good character, he was employed by the senate to raise a loan in order to save Frankfort from pillage by the French republican army. He obtained a loan from the landgrave (afterward elector) of Hesse-Cassel. The landgrave acquired immense sums by selling his subjects to fight for England and France. Napoleon, after the battle of Jena, pronounced the forfeiture of his estates, and a French army was on the march to his capital. He had accumulated in his palace vaults about a million sterling in silver, and sending for Rothschild to Cassel, he offered him the free use of the treasure, without interest, if he would convey it to a place of safety. With the aid of his Jewish friends, Rothschild succeeded in secreting the money, and thus saved it from the hands of the French. At this time he had five sons, three of whom—Anselm, Nathan, and Solomon—being grown up, he associated with himself in business. ANSELM remained with him at Frankfort. NATHAN came to England in 1800, where he acted as agent for his father, first at Manchester, in the purchase of Manchester goods for the Continent. He then removed to London, where by the agency of his father large sums of money were placed at his disposal, and invested by him with so much judgment that his capital multiplied with great rapidity. He was appointed, by the interest of the landgrave, agent for the payment of the £12,000,000 sterling which, by the treaty of Toeplitz, Great Britain stipulated to pay to her German allies. A large profit accrued to the house by this transaction. Previous to Rothschild's death (which occurred in Sept., 1812) he saw his five sons securely established as the monarchs of European finance—Anselm in Frankfort, Nathan in London, Solomon in Vienna, James in Paris, and Charles in Naples; all united in the wealthiest copartnership of the present or probably any other age. Nathan, in London, is said to have known the result of the battle of Waterloo several hours before the English government, and the knowledge is said to have been worth £200,000 to him. The loans contracted by the firm during the great war with France were not more remarkable for their magnitude than their success. They never took a bad loan in hand, and hardly any good loans fell into other hands. In addition to their five principal establishments they have agencies in many other cities both of the old and new world. On two or three occasions the Rothschilds have successfully exerted themselves to preserve the peace of Europe. Their losses from the French revolution in 1848, and from the depreciation in the funds and securities which followed the subsequent disturbances in various capitals of Europe, were estimated at the enormous figure of £8,000,000 sterling —a wild estimate, but proving the popular belief in the immense resources of the firm. Nathan, after his father's death, was considered the chief of the family. The emperor of Austria made him a baron of the empire in 1822. He died in 1836, at Frankfort, whither he had been called by the marriage of his eldest son, Lionel, to his cousin Charlotte, daughter of the baron Charles. Anselm, Solomon, and Charles all died in 1855, the first-named dying childless at Frankfort, and leaving a fortune valued at from 40,000,000 to 50,000,000 florins. James died in 1868.—Baron LIONEL DE ROTHSCHILD, eldest son of Nathan, and head of the London house, was born in London in 1808, and educated at Göttingen. He was early initiated by his father into the business of the firm, and successfully applied himself to extend its colossal operations. He was elected for London in 1847, 1849, 1852, and 1857, and at each election claimed to take the oaths and his seat in the house of commons. The latter words of the oath—"on the true faith of a Christian"—he insisted upon omitting, "as not being binding on his conscience." He was then desired to withdraw from the house, and patiently awaited the fate of the bill of Jewish emancipation, which usually passed the commons, and was rejected by the upper house. In 1858 he was placed on a committee which was to hold a conference with the house of lords, and this was virtually the means of establishing Jewish emancipation. The commons sent up another bill, and a general belief prevailed that if it were, like the rest, thrown out by the lords, Jewish members would be admitted by resolution of their own house, instead of by act of parliament. The lords gave way, merely taking measures to prevent the admission of Jews into the upper chamber. Baron Rothschild thereupon (July, 1858) took the oaths and his seat. He sat till 1868, when he was rejected, but was re-elected in 1869; and lost his seat in 1874. He died June 3, 1879. His brother NATHAN, his son NATHANIEL, and other members of the Hebrew faith have also been elected to the house of commons. As the members of each successive generation are received into the copartnership, and the cousins usually intermarry, and as their immense wealth is being continually augmented by a profitable business, the name and operations of the firm, as public-loan contractors, dealers in bullion, and bill-discounters, promise to last as long as some royal dynastics. It was this firm that, in 1875, supplied the £4,000,000 necessary for the purchase of the Suez canal shares.

ROTIFERA. See ROTATORIA.

ROTTECK, KARL VON, 1775-1840, b. Freiburg, Germany; educated for the bar, and a professor in the Freiburg university. He became interested in politics, joined the liberals, and wrote pamphlets against standing armies and on the powers of representative bodies. In 1819 he represented the university in the legislative council of the Baden states. He lost his professorship on account of his political opinions, but in 1840 was reappointed. His great work on the world's history, *Allgemeine Weltgeschichte*, was very popular in Germany, and has been translated into many languages.

ROTTEE, an island of the Malay archipelago, the southernmost island of Asia; 50 m. long, 20 m. wide; pop., 85,000. It lies at the s.w. extremity of Timor, and contains a Dutch settlement and the village of Rangong. The surface is mountainous and well timbered. Ebony and mahogany are found. The agricultural products are millet, maize, edible birds' nests, and honey. Much attention is paid to raising live stock, including buffalo.

ROTTENBURG, a t. in Würtemberg, 7 m. s.w. from Tübingen, is situated on the Neckar. Pop. '75, 6,416. The castle, built in 1216, is now the house of correction. In the neighborhood are extensive hop-fields, orchards, and vineyards. The Roman station Sumelocennis stood on the site of Rottenburg, and remains of roads and viaducts have been found. Rottenburg is the seat of a bishop.

ROTTEN-STONE, a mineral consisting chiefly of alumina, with about 10 per cent of carbonaceous matter, and a little silica. It is supposed to be formed by decomposition of shale. It is found in Derbyshire, England, in Wales, and near Albany, in the state of New York. It is brown; either grayish, reddish, or blackish. It is soft, and easily scraped to powder, and is well-known to housewives, being much used for cleaning and polishing brass and other metals.

ROTTERDAM (*dam* or dike of the *Rotte*), after Amsterdam, the largest city in the Netherlands, and a place of great commercial activity, is situated at the confluence of the Rotte with the Maas, in the province of South Holland. It forms a triangle with the apex to the n., and the base stretching along the river, ships from all parts of the world discharging their cargoes in front of the Boompjes, a splendid row of houses shaded with trees. The Hoog straat, built on the dam or dike formed to repel inundations, divides the city into the Binnenstad and Buitenstad, the former being n. of that line, the latter extending southward to the Maas. Broad canals or havens, full of shipping, cut the Buitenstad into islands, and lofty houses face the quays on either side. The largest canals are the Leuvenhaven and Oudehaven, which trend inward from the Maas, and the Scheepmakershaven, Wijnhaven, Blaak, Haringvliet, and Nieuwhaven, parallel with the river. Rotterdam is rapidly extending in all directions. The population has more than doubled within 50 years, and on Jan. 1, 1872, it amounted to 123,677, or 58,411 males, and 65,266 females. On Dec. 31, 1874, the number had risen to 129,289, or 59,817 males, and 69,422 females. About two-thirds are Protestants, nearly one-third Roman Catholics, and 4,500 Jews.

The industries are varied, including sugar-refining, gin-distilling, the making of liqueurs, beer-brewing, iron-founding, soap-boiling, the manufacture of vinegar, cigars, patent oil, sail and hair cloths, articles of gold and silver, ship-building, etc. The works of the Netherlands steamboat company, at Feijnoord, employ 700 men. The shipping trade is extensive. In 1875 there cleared in 863 sailing vessels of 274,497 tons, and 2,572 steamships of 1,380,074. Of these, 277 sailing-ships and 1975 steamers were from British ports, representing 1,028,063 tons; and 43 sailing-ships from British colonies. A large traffic is carried on with Germany, Belgium, and the interior of the Netherlands. Refined sugar is extensively exported. Large quantities of butter, cheese, yeast, madder, flax, and fruits are annually sent to Great Britain; also immense numbers of cattle, calves, swine, and sheep.

Rotterdam has railway communication with the other cities of the Netherlands, Germany, and Belgium. It is about 20 m. from the mouth of the Maas, the great commercial highway between the open sea and the Rhine provinces of Prussia. The municipal government consists of a burgomaster, 4 wethouders (aldermen or bailies), and 34 councilors. Rotterdam has 4 Dutch reformed churches, 1 French Protestant, 1 English Episcopal, 1 Scotch church, 6 Roman Catholic chapels, and 1 Jewish synagogue. The schools are good, and subsidized by the municipality. There are 3 for gymnastics; a normal school; one for training boys for sea; a medical school; an institute for the deaf and dumb, at which 93 boys, and 52 girls are educated by 15 teachers, 64 of the pupils being admitted free; a grammar school called the Erasmus; and several institutions for arts, sciences, architectural drawing, and music. The medical school has an anatomical museum; the Batavian society possesses a good collection of philosophical instruments, books, and models. The museum Boijmans, with many valuable paintings and works of art, was destroyed by fire in 1868. The exchange, built in 1722, is a plain rectangular building of hewn stone. The hospital, on the Coolsingel, a handsome erection, with excellent internal arrangements, can receive 250 patients. Rotterdam has also a children's hospital, which is a great boon to the poor. The St. Laurence church, built at the end of the 15th c., is a spacious building, resting on 14 Gothic pillars, and ornamented with a high truncated tower, the top of which is reached by 326 steps. It has a splendid organ, and several beautiful marble monuments, in honor of De Witt, admiral Kortenaar, and other distinguished men. A bronze statue of Erasmus stands on the great market, and the house in which he was born is pointed out in the Breede Kerk straat, which leads to the great church. The city has been added to and improved, and the water-way to the sea deepened and altered (the works completed in 1872), so as to avoid, as far as possible, the hindrances to the navigation which are caused by the sand-banks at the mouth of the Maas.

ROTTI, an island in the Indian archipelago, belonging to the Dutch, lies to the s.w. of Timor, between 10° 39′ and 10° 56′ s. lat., and 122° 57′ and 123° 29′ e. long.; pop. 75,000. Its greatest length, from e. to w., is 36 m., and the breadth from Termano, on the n., to Tilly, on the s., about 11 miles. The surface, though hilly, is nowhere more than 600 ft. above the sea, and the fertile soil produces a rich vegetation.

The most valuable product is the lontar palm, the wine or juice of which, either used fresh or thickened by boiling, and preserved in pots, forms a leading article of food. Next in importance is the gabang tree, which bears large quantities of fruit, in size and shape like apricots, the fiber yielding a good tow, and the pith a sort of sago. Cocoanut, plantain, banana, and mango-trees are abundant. There is a great variety of timber trees, as beautiful ebony, mahogany, and several sorts well adapted for ship-building. The Rottinese plant millet, tobacco, rice, etc. Rotti is famed for a small but noble and hardy race of horses, which are bought for exportation at about £1 6s. each. There are many buffaloes, sheep, goats, swine, deer, fowls, etc. Edible nests, tripang tortoise-shell, and wax are articles of export. Horses, swine, palm-wine, syrup, sugar, and native sail-cloth are exported to Timor, and cotton fabrics, cotton, beads, iron, iron-work, powder, guns, and arrack received in exchange.

The Netherlands' missionary society have made considerable progress in Christianizing the natives, who are a fine-looking race, originally, it is thought, from Java. See *Land en Zeetogten in Nederlands Indië*, by Johannes Olivier; *Reis door den Indischen Archipel*, by L. J. van Rhijn.

ROTTLERA, a genus of trees of the natural order *euphorbiaceæ*, with a 3 to 5 parted calyx, no corolla, 30 to 40 stamens springing from the convex receptacle, and a 2 to 4 coccous capsule, each portion having one seed. The species are rather small trees, found in India and other tropical parts of Asia. *R. tetracocca* grows in Sylhet, and yields a hard and valuable timber. *R. tinctoria* is a native of India, from the Coromandel coasts to the northern forests. Its capsules are covered with short stiff hairs, which, when rubbed off, have the appearance of a fine red powder, are used in India for dyeing silks scarlet and orange, and form an article of commerce in that country. Professor Anderson of Glasgow has examined this dye-stuff, and in the *Edinburgh Philosophical Journal* for April, 1855, has stated his opinion that it merits the attention of silk-dyers. The color which it yields is of great beauty and great stability.

ROTTWEIL, a small t. of Würtemberg, on a declivity on the left bank of the upper Neckar, 38 m. e.n.e. of Freiburg in Baden. It contains a beautiful exchange, a number of interesting churches, and two powder-mills. Its manufactures are silk, cotton, and woolen fabrics, and its corn-market is one of the most important in the kingdom. Pop. '75, 5,547.

Rottweil is the site of an ancient Roman colony, among the ruins of which was discovered, besides a large number of other valuable antiquities, now preserved in the buildings of the gymnasium, a now well-known piece of mosaic work, upon which, among others, are an excellent drawing of Orpheus, and a number of profile drawings of the larger kinds of game, of chariot-races, and of gladiatorial encounters.

ROTUN'DA, a building with circular exterior and interior, such as the Pantheon of Rome.

ROTURIER (according to Duncange, from *rupturarius*, a peasant; *ab agrum rumpendo*), one of the ignoble classes, who, during the early period of the feudal system, were separated from the high-born by almost as broad a line of demarkation as that which divided liberty from servitude. When the feudal theory of knight's-service came to be recognized as the only principle of gentle tenure, the term roturier came to be applied to the part of the population who continued to hold by the older or allodial tenure.

ROUARIE, Armand Taffin, Marquis de la, 1756–93; b. France; commissioned in the American army as col. He served under gen. Gates, and took part in the siege of Yorktown. He returned to France in 1784, and was subsequently at the head of a conspiracy against the republic of France for the benefit of the allied powers in the war, 1791, and in the interest of the exiled Bourbons.

ROUBAIX, a flourishing manufacturing t. in the n. of France, in the dep. of Nord, and 6 m. n.e. of Lille. It has risen into importance only in the present century. Numerous mills and factories, as well as dye-works and tanneries, are in operation. Roubaix rivals Elbeuf and Louviers for woolen cloths and carpets, and vies with Laval and the rest of Flanders in linen manufactures. Pop. '76, 74,946.

ROUBILIAC, LOUIS FRANÇOIS, 1695-1762; b. Lyons, France; educated in Paris, and settled in England, where he executed a statue of Shakespeare for Garrick which is now in the British museum, one of Newton, in Cambridge, and monuments to the duke of Argyll and to Handel for Westminster abbey.

ROUEN (Lat. *Rotomagus*), one of the principal manufacturing and trading cities of France, and the capital of the dep. of Seine-Inférieure, is situated on the right bank of the Seine, 87 m. n.w. of Paris by railway. The ramparts have been converted into spacious boulevards, which, as well as the quays that line the river-banks, are little, if anything, inferior to the boulevards and quays of Paris. The deep waters of the Seine form a commodious port, which is generally crowded with ships of all nations, from vessels of 300 tons to the smallest river craft. A stone bridge and a suspension-bridge connect the faubourg St. Sever, on the left bank of the river, with the city, which is at once one of the most picturesque and one of the busiest and liveliest places in France. Some of the streets are well and regularly built, with fine modern stone houses; but the greater part of Rouen consists of old, ill-built, but picturesque streets and squares, with tall, narrow, quaintly-carved, wooden-bound, and gabled houses. Among the many beautiful Gothic churches for which it is noted, the finest are the cathedral and the church of St. Ouen. The former, one of the noblest metropolitan churches of France, is a remarkably fine specimen of Gothic architecture. It is built in a cruciform shape, and has two towers at the sides of the w. entrance, and a lofty tower (464 ft. high) terminating in a cast-iron spire, which was erected after the destruction by fire in 1822 of the old wooden belfry, which bore the date of 1544. It was erected by Philippe Auguste between 1200 and 1220, and contains, in its 25 highly-ornamented chapels, numerous monuments of great interest, among others, those of duke Rollo of Normandy, and his son, William Long-Sword. The heart of Richard Cœur de Lion, buried in this church, is now preserved in the extensive museum of antiquities. The church of St. Ouen, as large as the cathedral, is one of the most interesting buildings in Rouen, and in its present restored state presents a pure and elegant specimen of Gothic architecture. Among the other buildings of Rouen, the finest are the palais de justice, belonging to the 15th c., and built for the parliament of the province; the hôtel de ville, with its public library of 110,000 volumes and its gallery of pictures; and the hôtel Dieu, one of the largest of its kind. Rouen has numerous benevolent, educational, and scientific institutions; and next to Lyons is perhaps the most important manufacturing town in the empire. The principal branches of industry are cotton manufactures, including the checked and striped cottons specially designated as *Rouenneries*, nankeens, dimity, lace, cotton velvets, shawls, etc. Rouen has also extensive manufactories of hosiery, mixed silk and wool fabrics, blankets, flannels, hats, cordage, cotton and linen yarns, shot, steel, lead, chemicals, paper, etc. Among other branches of industry, we may mention ship-building and machinery in various departments. Rouen is the seat of an archbishop, a high court of justice for the department, a tribunal of first instance, and of commerce, etc. Pop. '76, 104,863.

History.—As the original capital in France of the Northmen, who took possession of it in 842, and settled there in accordance with the agreement which Charles the simple was compelled to make with their leader Rollo, Rouen presents special points of interest to Englishmen It was the residence of the dukes of Normandy till duke William, in 1066, on his conquest of England, transferred the seat of his court to London; and, till the time of Richard Cœur de Lion, it continued to be the capital of Normandy, and was the seat of government of the Norman possessions of William the conqueror's successors; but in 1204 it was taken by siege by the French king Philippe Auguste, and annexed with the main part of the duchy to the French crown. During the wars of Henry V. and Henry VI. of England, it was under the power of the English from 1419 to 1449, when it was retaken by the French under Charles VII. It was during this occupation by the English that Joan d'Arc was burned alive (1431) as a witch in the square of the city, in which stands her statue, and which is called, in memory of her, place de la Pucelle. Rouen was occupied by German troops in the war of 1870-71.

ROUGE, a preparation of safflower, used to give an artificial color to the cheeks, and, when properly prepared, said to be perfectly innocuous to those who use it. The color is obtained through a long and elaborate process, by precipitating it from the safflower, by means of citric acid or lemon-juice, on to prepared cotton. It is then washed out of the cotton with a solution of soda, and again precipitated with citric acid; but previous to adding the acid, finely-powdered French chalk is added to the solution, which becomes colored and falls down, when the precipitation takes place, giving the necessary body and a peculiarly silky luster to the coloring matter. *Jeweler's rouge* is a preparation of iron formed by calcining sulphate of iron, or green vitriol, until the water of crystallization is expelled; it is then roasted in a strong heat, and afterward washed with water, until it no longer affects litmus paper. *Liquid rouge* is the red liquor left in making carmine.

ROUGÉ, OLIVIER CHARLES CAMILLE EMMANUEL, DE 1811–72; a French student of Egyptian monuments and hieroglyphics, professor of archæology in the college of France, and associate-editor of the *Revue Archæologique.* His published works embrace discussions of nearly all the discoveries in Egypt from 1840 to 1869.

ROUGE CROIX, one of the pursuivants belonging to the heraldic establishment of England, generally allowed to be the most ancient, although the period of institution is uncertain. The title is derived from the red cross of St. George, the patron saint of England.

ROUGE DRAGON, the title of a pursuivancy founded by Henry VII. on the day before his coronation. The name is taken from the supposed ensign of Cadwaladyr, the last king of the Britons, ancestor of that monarch. The red dragon was also sometimes used by Henry VII. as a supporter.

ROUGE ET NOIR (Fr. "red and black"), TRENTE-UN ("thirty-one"), or TRENT ET QUARANTE ("thirty and forty"), is a modern game of chance, which is played by the aid of packs of cards on a table covered with green cloth. The table is divided into four portions, each marked in the center with a diamond, the diamonds being alternately red and black; and these quarters are further separated, two and two, by bands which cross the table at its narrowest part. At the end of the table are a series of concentric bands painted of a yellow color. The game is played as follows: one of the *tailleurs* (or dealers, who manage the table, take charge of the bank, and keep an eye on the players) takes up his position at one side of the table, opposite to the *croupier* (another tailleur), and unseals, in the presence of the players, six packs of cards, which are first counted, then shuffled by several tailleurs, and returned to the first tailleur, who presents them to one of the players to be cut. This is performed by the insertion of a blank card in any part of the pack, which is then adjusted, and the game proceeds. Each player must stake his money on some one of the four chances, denominated *noir*, *rouge*, *couleur*, and *l'inverse*, which will be afterward explained. After the stakes have been laid on the table (those for the noir being laid on either of the quarters marked with a *black;* and those for the rouge, on either of the quarters marked with a *red* diamond; those for the "couleur" on one of the transverse bands; and those for the "inverse" on one of the yellow circles at the end of the table), the tailleur takes a handful of cards from the top of the pack, and deals first for the noir, taking one card after another from the top of the handful and placing them on the table side by side, till the number of pips on them amounts to more then 30, when he stops. He then deals out another row in a similar manner for the rouge, till, as before, the number of pips amounts to more than 30. In reckoning the number of pips, the ace is counted as one, the other plain cards according to the number of pips, and the court-cards 10 each. It will thus be seen that the number to which each of the two rows of cards amounts, must be more than 30 and not more than 40. If the value of the first row is nearer 31 than that of the second, then the first row, or noir, wins, if the contrary is the case, then the second row, or rouge wins. Couleur wins if the first card tabled by the tailleur is of the winning color; thus, for instance, if the first card laid down is a "spade" or "club," and if noir wins; but if the first card dealt be not of the winning color, then inverse wins, and couleur loses. Two (and no more) of the four chances can be winning chances at one time; and the winning players have their stakes increased by an equal sum from the bank, and then withdraw their stake and winnings, while the stakes of the losers are raked by the tailleurs to the bank in the center of the table. When the value of the first, or noir-row, is equal to that of the second, or rouge-row, it is a *refait*, and the dealer must commence to deal anew from the cards remaining in his hand; when the refait occurs, the player may either withdraw his stake, or stake on a different chance, with the same or more or less money as he thinks proper. The game of rouge et noir would be an even one between the players and the bank, were it not for the following regulation: When the points dealt for the noir and the rouge each amount to 31 ("un refait de trent-et-un"), the half of all the stakes on each of the chances belongs to the bank, and this the players may either pay or have their stakes "put in prison," the next deal determining whether they shall belong to the bank or be restored to the player. If a second doublet of 31 occurs in the deal immediately succeeding, the stakes which were in prison are diminished by one-half, which goes to the bank, and the other half is "put into the second prison," from which it requires two successive winnings of the player to regain them. The chance of "un refait de trente-et-un" is about once in 64 deals.

This game superseded *faro* (q.v.) and *biribi* in France about 1789, but along with roulette (q.v.), was forbidden by law in 1838.

ROUGET, GEORGES, 1781–1869; contemporary of the painter David, and author of many celebrated pictures; among them are the "Death of St. Louis," "Henry IV. at the Siege of Paris," and a considerable number representing phases in the life, and at the court of Napoleon I.; including the coronation and the death of Napoleon.

ROUGH-CAST, a kind of coarse plaster mixed with gravel, which is applied to the exterior of walls to protect them from the weather. It is also called *harling* in Scotland, where it is much used.

ROUHER, EUGÈNE, a very eminent French statesman, was b. at Riom, on Nov. 30, 1814. He first distinguished himself as an advocate at the bar of his native town, at which he practiced up to 1848. The attention of the country was first drawn to him by the ability he showed in a press prosecution, in which he was engaged for the defense. In 1848 he was returned by the department of Puy-de-Dôme to the constituent assembly, which was summoned after the revolution of that year, and in the following year he was returned to the corps législatif by the same department. On the break-up of Odillon Barrot's cabinet, the first ministry of Louis Napoleon, toward the end of 1849, Rouher was appointed minister of justice; and with slight interruptions, he has been since then a member of the French government. In the corps législatif he showed himself a moderate politician; and he never affected to consider the republic an improvement on the constitutional system which had preceded it. In 1852 he was appointed vice-president of the council of state, with the oversight of the departments of legislation, justice, and foreign affairs. In 1855 he was appointed minister of agriculture, commerce, and public works, and in this office he found extraordinary opportunities for the exercise of his administrative ability. In the negotiation of the treaty of commerce with England, which—much decried both in France and in England at first—is now admitted to have conferred, immense advantages upon both countries, the negotiations were conducted by M. Rouher and M. Baroche on the part of France, by lord Cowley and Mr. Cobden on the part of England; the treaty was signed on Jan. 22, 1860. The arrangements consequent upon the treaty involved immense labor and manipulation of details, and the chief part in adjusting them devolved upon M. Rouher and Mr. Cobden. In 1863 he negotiated a treaty of commerce between France and Italy, receiving from the king of Italy, in acknowledgment of his merits, the orders of St. Maurice and St. Lazaire. He has thus been the chief instrument in the introduction, or in preparing the way for the introduction, of free trade as the commercial policy of France and the neighboring continental countries.

In June, 1863, M. Rouher retired from the ministry of agriculture and commerce, and was appointed president of the council of state in succession to M. Baroche. Soon after, he took the office of minister of the interior; and in Oct., 1863, on the death of M. Billault, he was appointed minister of state. In this office he had to represent the government as "talking-minister" in the corps législatif; and it is admitted that he had no superior as a debater among the great orators trained under the constitutional system, and these were able rivals. His reputation as a debater stands as high as his reputation as an administrator; and it may safely be said that he has no superior, if any equal, for ability among the French politicians of the time. In Jan., 1867, when the late emperor, by a decree, introduced certain modifications of the privileges of the corps législatif, and of the relations between that body and the ministers, M. Rouher, with the other members of the cabinet, resigned office, but he was immediately reinstated in it. He was appointed a member of the French senate on June 18, 1856. He became grand officer of the legion of honor in 1856, and gained the grand cross in Jan., 1860. He was returned to the national assembly for Corsica in 1872.

ROULERS, a t. of w. Flanders, Belgium, 19 m. s.s.w. of Bruges. In the vicinity flax is extensively grown, and in the town linen is largely bleached and manufactured. Pop. '70, about 14,200.

ROULETTE (Fr. "a little wheel"), a game of chance which, from the end of last century till the beginning of 1838, reigned supreme over all others in Paris. It continued to be played at German watering-places till 1872, when it ceased in terms of an act passed four years before. Roulette is still played at Monaco, in Italy. As much as £8,000 a year used to be spent in the papers of Paris alone advertising this game, which is purely one of chance, and is played on a table of an oblong form, covered with green cloth, which has in its center a cavity, of a little more than two feet in diameter, in the shape of a punch-bowl. This cavity, which has several copper bands round its sides at equal distances from each other, has its sides fixed, but the bottom is movable round an axis placed in the center of the cavity; the handle by which motion is communicated being a species of cross or capstan of copper fixed on the upper extremity of the axis. Round the circumference of this movable bottom are 38 holes, painted in black and red alternately, with the first 36 numbers, and a single and double zero; and these 38 symbols are also figured at each end of the table in order that the players may place their stakes on the chance they select. Along the margin of the table and at each end of it are painted six words, *pair*, *passe*, *noir*, *impair*, *manque*, *rouge*, which will be afterward explained. Those who manage the table and keep the bank are called *tailleurs*. The game is played as follows: one of the tailleurs puts the movable bottom in motion by turning the cross with his forefinger, and at the same instant throws into the cavity an ivory ball in a direction opposite to the motion of the bottom: the ball makes several revolutions, and at last falls into one of the 38 holes above mentioned, the hole into which it falls determining the gain or loss of the players. A player may stake his money on 1, 2, or any of the 38 numbers (including the zeros), and shows what number or numbers he selects by placing his stake upon them; if he has selected a number or zero corresponding to the one into which the ball falls, he receives from one of the tailleurs 36 times his stake—viz., his stake and 35 times more—if he selected only 1 number, 18 times if 2 numbers, 12 times if 3 numbers, etc. The blank rectangles at the bottom of each of the 3 columns of numbers figured on the table are for the reception of the stake of that player who selects a column (12 numbers) as his chance, and if the ball enters a hole the number of which is found in his column, he is paid 3 times his stake. Those who prefer staking their money on any of the chances marked on the edge of the table, if they win, receive double their stake (their stake and as much more), and under the following circumstances: the "pair" wins when the ball falls into a hole marked by an *even* number; the "impair," if the hole is marked *odd;* the "manque," if the hole is numbered from 1 to 18 *inclusive;* the "passe," if it is numbered from 19 to 36 *inclusive;* the "rouge," if it is colored *red;* and the "noir," if it is colored *black.* If the ball should fall into either of the holes marked with the single or the double zero, the stakes of those players who venture upon the 6 chances last described are either equally divided between the bank and the players, or, as is more commonly the case, they are "put in prison," as it is called, and the succeeding trial determines whether they are to be restored to the players or gained by the bank. Should it so happen that at this trial the ball again falls into one of the two holes (the chance against its occurring is 360 to 1) marked with zeros, then half of the stakes in prison are taken by the bank, and the remainder are "put into the second prison," and so on. The tailleurs thus have an advantage over the players in the proportion of 19 to 18. The player who bets upon the numbers labors under a similar disadvantage, for although the two zero-points do not affect him in the same way as the player who stakes upon one of the other 6 chances, still (supposing him to bet upon a single number) as the chances are 37 to 1 against him, he ought to receive 37 times his stake (besides the stake) when he does win, whereas he only receives 35 times that amount, a manifest advantage in favor of the bank in the proportion of 37 to 35.

ROUMA'NIA. See ROMANIA and MOLDAVIA.

ROUME'LIA (Turkish *Rumili*), a name used to denote an important portion of European Turkey, differing widely in area at various times, but most generally applied to the region between the Balkans and the Ægean, corresponding to the ancient Thrace and part of Macedonia.

ROUMELIA, EASTERN, a province of the Ottoman empire, lying immediately to the south of the Balkans. It is inhabited mainly by Bulgarians and Greeks, and though remaining under the direct military and political authority of the sultan, had administrative autonomy conferred on it by the Berlin congress of 1878. Internal order is maintained by a native gendarmerie and a local militia, the officers of which are appointed by the sultan; and the Porte retains the right of defending the frontiers by fortresses garrisoned by Turkish troops. The governor-general, nominated by the Porte, must be a Christian, and the constitution is settled by a European commission.

ROUND, in music, a short vocal composition, generally of a humorous character, in three or more parts, all written on the same clef. Each voice takes up the subject at a certain distance after the first has begun. The second voice begins the first part when the first begins the second part, and the third takes up the first part when the second begins the second part, the whole ending together at the mark of a pause, 𝄐, or a signal agreed on.

ROUND-FISH, *Coregonus quadrilateralis,* (see COREGONUS), a fish found in the western parts of North America, from Vancouver's Island northward, in the rivers on the western side of the Rocky mountains, and in the Mackenzie and Coppermine rivers. It ascends the rivers in summer to spawn, spending part of its life, like the salmon, in the sea. It is a beautiful fish; seldom more than two pounds in weight, of a yellowish-brown color, paler on the sides and belly than on the back, with bright and glittering scales, each of which is edged with a narrow band of dark gray; the mouth very small, no teeth perceptible. Before spawning, it is loaded with fat, which, on the shoulders, almost amounts to a hump; but after spawning, it becomes thin, and its flesh watery and insipid. In a good state, it is a very delicious fish, rivaling in excellence its congener, the whitefish (q.v.). This fish is an important article of food to the Indians of north-western America, and vast numbers are caught in the rivers as they ascend from the sea. They ascend in such numbers that no ordinary contrivances of fishing are necessary, but the fish are baled out by baskets, little nets, wooden bowls, or even by the hand. They are cured by splitting and drying, like salmon. The round-fish readily takes a rough gaudy fly.

ROUNDHEADS, a name given by the adherents of Charles I., during the English civil war, to the Puritans, or friends of the parliament, who distinguished themselves by having their hair closely cut, while the cavaliers wore theirs in long ringlets.

ROUNDLE, or ROUNDLET, in heraldry, a general name given to charges of a circular form, which, in English heraldry, have more special names indicative of their tinctures· the roundle or being, for example, called a *bezant;* and the roundle gules, a *torteaux.*

ROUND ROBIN, a name given to a protest or remonstrance signed by a number of persons in a circular form, so that no one shall be obliged to head the list. The round robin originated in France, and the name is derived from the words *rond*, round, and *ruban*, a ribbon.

ROUND TABLE, KNIGHTS OF THE. See ARTHUR and NOVELS.

ROUND TOWERS. Tall narrow towers tapering gradually from the base to the summit, and found abundantly in Ireland, and occasionally in Scotland, are among the earliest and most remarkable relics of the ecclesiastical architecture of the British Islands. They have been the subject of endless conjecture and speculation among antiquaries, who have connected them with pagan times and pagan rites, but the controversies regarding them have to a certain extent been set at rest by the investigations of Dr. Petrie; and there can be now no doubt that they are the work of Christian architects, and built for religious purposes. They seem to have been in all cases attached to the immediate neighborhood of a church or monastery, and like other early church-towers (an older invention than bells), they served as symbols of dignity and power—while they were also capable of being used as strongholds, into which, in times of danger, the ecclesiastics, and perhaps the inhabitants of the country around, could retreat with their valuables. After the introduction of bells, they were also probably used as bell-towers. About 118 towers of this description are yet to be seen in Ireland—20 of which are entire or nearly so; and Scotland possesses three similar towers, at Brechin, Abernethy, and St. Eglishay in Orkney. They are usually capped by a conical roof, and divided into stories, sometimes by yet existing floors of masonry, though oftener the floors have been of wood. Ladders were the means of communication from story to story. There is generally a small window on each story, and four windows immediately below the conical roof. The door is in nearly all cases a considerable height from the ground. The tower at Devenish, in Ireland, which may be considered as a typical example of the class, is 82 ft. in height, and furnished with a conical cap. A battlemented crown occasionally supplies the place of the conical roof, and in one instance the base of the tower is octagonal. Dr. Petrie is inclined to think that a few of these remarkable structures may be as old as the 6th c.; but this great antiquity has been questioned by later writers, particularly Dr. Daniel Wilson, who considers it not borne out by the character of the architectural details, and would assign them all to a period ranging from the 9th to the 12th centuries. The source whence this form of tower was derived, and the cause why it was so long persisted in by the Irish architects, are points which have not yet been cleared up. Two round towers, similar to the Irish type, are to be seen in the yet extant plan of the monastery of St. Gall in Switzerland, of the first half of the 9th c.; and, in the Latin description attached to the plan, they are said to be *ad universa superspicienda.* The church and towers as rebuilt at that date are no longer in existence; but the latter were probably introduced in honor of the founder of the monastery, who was the leader of a colony of Irish monks, who, early in the 6th c., carried civilization and religion into the fastnesses of the Alps. The form thus introduced became traditional in West Germany in the succeeding Romanesque style, where we have it reproduced with but little modification at Worms cathedral and elsewhere. See Dr. George Petrie's *Ecclesiastical Architecture of Ireland anterior to the Anglo-Norman Invasion* (Dublin, 1845); Dr. Daniel Wilson's *Prehistoric Annals of Scotland*,

ROUP, a Scotch legal term synonymous with auction (q.v.).

ROU'SAY, or ROWSA, one of the Orkney islands, between the island of Westray on the n., and Pomona on the south. It is 4 m. long, 3 m. broad, is hilly, and covered with heath in the center, but has a margin of fertile land along the shore. Pop. '71 860.

ROUSE'S POINT, a village in n.e. New York, on the Ogdensburg and Lake Champlain railroad at the junction of the Grand Trunk and Central Vermont; pop. '70 about 2,000. It is at the n. extremity of lake Champlain, which at this point is crossed by a floating railroad bridge 5,000 ft. long, constructed at a cost of $300,000. It is ½ m. s. of the Canada line, at the mouth of Richelieu river, and the customs receipts average $500,000 annually. Printing is an important industry, and it contains a large publishing house in the international book-trade. The harbor is defended by fort Montgomery. Lumber is largely exported, employing an extensive fleet of vessels. The manufacture of tobacco pipes is among the industries.

ROUSSEAU, JEAN BAPTISTE, 1670–1740; b. Paris; son of a shoemaker, but received a liberal education, and wrote some poetical pieces which impressed marshal Tallard so favorably that he took him to England as his secretary. On his return to Paris he was admitted into the best society, and was much courted owing to his poetical fame. In 1712, however, he was prosecuted for being the author of some couplets in which the characters of several persons of wit and merit were blackened by the most atrocious calumnies. The scandal was so great that he was banished from France, to which he was never to return. But he always denied, even on his death-bed, his having been author of those satires. He went to Switzerland, accompanied prince Eugene to Vienna, and remained with him about 3 years. When he lost his favor by satirizing one of his mistresses he retired to Brussels, where he afterward usually resided. He gained a fortune by publishing his works in England, but lost it by placing it in the hands of the Ostend company.

ROUSSEAU, JEAN JACQUES, a French author, celebrated not less for the singularities of his character, and the misfortunes of his life, than for the brilliancy and sentimental enthusiasm of his writings, was born at Geneva June 28, 1712. The family to which he belonged was of French origin, but had been settled for more than a century and a half in the little republican city, where his father, Isaac Rousseau, was a watchmaker. Deprived of his mother before he was a year old, Rousseau's infancy was tenderly cared for by a sister of his father's. At the age of ten he was placed, along with a cousin, under the charge of a M. Lambercier, Protestant pastor of Bossey, near Geneva, with whom he remained two years. At fifteen a profession was chosen for him after considerable deliberation—that of *procureur* ("attorney"), and he was sent to a M. Masseron, to acquire a knowledge of engrossing, but that gentleman quickly dismissed him as a hopeless subject. In 1725 he was apprenticed to an engraver of Geneva, named Abel Ducommun, a harsh and violent man, from whose vulgar tyranny the sensitive and impulsive youth took refuge in flight (1728). Henceforth, to the end of his harassed and melancholy career, he was a wanderer; resting for a brief space in many homes, and making many friends, but always driven from the former, and robbed (or thinking himself robbed) of the latter. His first protector was a Mme. de Warens, in Savoy, by whose exertions he was placed at a charity-school in Turin. Here, however, he felt himself so miserable that he ran off, lived ambiguously for some time "with the wife of a soldier," but in spite of his "innocent passion" was very properly kicked out of doors by the irritated husband on his return; after which he became a lackey in the house of the countess of Vercelli, where (as stated by himself in his *Confessions*) he stole a silk ribbon, and then accused a maid of the theft—in consequence of which both were dismissed. Finally, after certain vagabond adventures, he returned to his protectress, but again fell into irregular courses, whereupon Mme. de Warens conceived the amazing idea of rescuing the youth (who was now in his 21st year) from the temptations of vice by becoming his mistress herself. To preserve appearances, however, Rousseau always addressed her as *mamma*. In 1736 the two went to live at Charmettes, near Chambery. Here Rousseau fell into a state of hypochondria, and went to Montpellier to place himself under medical treatment, but on his way thither fell in with a young lady whose charms quite dissipated all his morbid delusions. On his return he found that Mme. de Warens had consoled herself during his absence by another lover, whereupon he betook himself to Lyons, and lived as a house-tutor for three years. Thence he proceeded to Paris in the autumn of 1741—under the conviction that he had made certain grand improvements in musical notation (of which in fact he hardly knew the elements), and read a paper on the subject before the *académie des sciences*, but was told that his "improvements" were "neither new nor practicable." However, he managed to live here in an obscure way until he got the appointment of secretary to M. de Montaign, French ambassador at Venice. After a stay of 18 months in the city of islands, he returned to Paris, and finding his superior intolerable, became intimate with Diderot, Grimm, D'Holbach, and Mme. d'Epinay, the last of whom in 1756 provided a charming retreat for him in the vicinity of Paris, called the *Hermitage*, where he lived with a young girl of low origin, named Thérèse le Vasseur, who bore him five children, all of whom were sent by him to the foundling hospital—perhaps the most scandalous act of his strange life. Rousseau afterward married Thérèse, who seems to have been a faithful and affectionate creature of small capacity. The causes of his rupture with the clique of Parisian philosophers and fine women have been the subject of envenomed misrepresentation in France, but from the thorough and accurate researches of M. Morin (see *Essai sur la Vie et le Caractère de J. J. Rousseau*, Paris, 1751), it turns out that Rousseau was reallythe victim of an elaborate and odious conspiracy on the part of men who betrayed the confidence that he reposed in them. The conduct of Grimm was especially shocking. Driven from the Hermitage in 1757, he again found a temporary asylum with the duke and duchess of Luxembourg: but in 1762 he found it necessary to retire to Switzerland, and fixed himself at Motiers-Travers in Neuchatel, where he obtained the protection of Marshal Keith, then governor of that Prussian province. The intrigues of his enemies pursued him even thither, and after certain paltry persecutions, lay and clerical, he accepted the offer of David Hume to visit England, where he arrived in 1766. Misunderstandings, however, ensued with the Scotch philosopher, and in the following year he returned to France, and was installed in the castle of Trye by the prince of Conti. He did not remain long there, nor did he enjoy peace. Calumnies of the grossest kind were circulated against him, and once more he sought security in precipitate flight. In 1770 he reappeared in Paris, where he lived in obscurity, but not in tranquillity, for eight years, when M. de Girardin offered him a refuge at his estate of Ermenonville, near the capital, in the beginning of 1778, and here the unhappy Rousseau died on July 2 of the same year.

Rousseau's personal character is a puzzle to moralists. There is no denying the vices and meannesses which stained it: these rest on the most unimpeachable testimony —his own. They are set forth with copious and melancholy sincerity in his *Confessions*, and the very incidents that lead us to condemn him most severely would never have been known to the world had he not chosen to reveal them. But he does not exculpate himself (as many suppose); on the contrary, he covers himself often with bitter and sad reproaches. On the whole, we are inclined to believe that he was, at bottom, an honest, warm-hearted, humane creature—free from guile, but full of a feminine jealousy, aggravated by long persecutions into a species of insanity; volatile, but not faithless; an erring, but withal a lovable mortal. His grand defect was in strength of will. "A man in convulsions," says Carlyle, speaking of Rousseau (*Heroes and Hero-worship*), "is not strong, though six men cannot hold him;" and all through his spasmodic life, and the splendid sentimentalism of his writings, we are conscious of a "forcible feebleness," a want of genuine intellectual power and insight. His opinions in a philosophical point of view are valueless; men of any vigor or acuteness care nothing for his notions about the social contract—influential though they once were during that period of crazy enthusiasm and sham speculation, the French revolution—nor for his shallow panegyrics on the "savage state;" but when he paints the emotions of a tender and voluptuous love, the rose-colored charm of his genius is irresistible. The most famous of his productions are *Discours sur l'Origine et les Fondements de l'Inegalité parmi les Hommes* (Amst. 1755); *Julie, ou la Nouvelle Héloïse* (1760); *Du Contrat Social, ou Principes du Droit Politique* (Amst. 1762); *Emile, ou de l'Education* (Amst. 1874); and *Les Confessions, suivies des Rêveries d'un Promeneur Solitaire* (Geneva, 1782; posthumous); but besides these he wrote a vast number of miscellaneous essays, letters, and treatises. His *Œuvres Complètes* have gone through innumerable editions. See Morley's monograph (1873).

ROUSSEAU, Lovell Harrison, 1818–69, b. Ky.; his education was scanty; he studied law and in 1841 was admitted to the Indiana bar. In the Mexican war he was a capt. of volunteers, and was in the battle of Buena Vista. He practiced at Louisville, obtained a high position at the bar, and was a member of the state senate. In 1860 he sided with the unionists, raised two regiments of volunteers, and encamped them on the Indiana side of the river. In 1861 he was made brig.gen. of volunteers and had commands at the battles of Shiloh, Perryville, Stone River, Chattanooga, and Chickahominy, 1864 he was placed in command of the district of Tennessee, and made a dashing raid into Alabama, destroying the Atlanta and Montgomery lines of railroad. He was brevetted maj.gen. promoted to the rank of brig.gen. in the regular army, and held commands in Alaska and New Orleans. In 1865 he was elected to congress from Kentucky.

ROUSSEAU, Philippe, b. Paris, 1816; studied painting under Gros and Victor Bertin, and exhibited first in the salon of 1831. His works have been extremely popular, mostly landscapes, or paintings of a semi-rural character, or of animals, in amusing exhibitions of their peculiar natures. They have been extensively engraved, copied and imitated, and form originals for thousands of now common household pictures, and book illustrations. Among them are the "*Rat de Ville et le Rat des Champs*;" the *Loup et l'Agneau;* and many others illustrative of the fables of La Fontaine.

ROUSSEAU, Théodore, 1812–67; b. France; early among modern painters to separate a simple delineation of natural objects from associate objects intended to suggest some classic imitation or personal interest. The French salon was fully opened to him in 1849. In 1852, at the expositions of 1855 and 1869, his paintings received honors among the highest. He is considered almost the head of the realist school in landscape; and his character was as simple, grave, and thoroughly independent, as the forms of nature which he courted. Among his famous works were the *Allée de Châtaigniers*, bought by the khedive of Egypt, and a great number of scenes in the forest of Fontainebleau in which he lived.

ROUSSETTE'. See Kalong.

ROUSSILLON, formerly a province of France, was bounded on the n. by Languedoc, on the e. by the Mediterranean, on the s. by the Pyrenees, and on the w. by the county of Foix. It now forms the French department of the Pyrénées Orientales. In ancient times the capital was *Ruscino*, which stood in the vicinity of Perpignan.

ROUT, one of the absurd names given to a fashionable evening assembly in London toward the end of the 18th and early part of the 19th centuries. At these entertainments as many as 2,000 to 3,000 ladies and gentlemen were invited, and when the apartments were not sufficiently spacious for the company, temporary rooms were erected in the rear of the house, and elegantly fitted up. Crowded assemblies of this kind are now known as "soirées," or "at homes." For an amusing account of them we refer to Mrs. Stone's *Chronicles of Fashion*, vol. ii. p. 262.

ROUVILLE, a co. in s.w. Quebec, Canada, bounded on the n.w. by the Richelieu river, drained by the Yamaska river, crossed by the Montreal, Chambly and Sorel, and the Stanstead, Shefford and Chambly railroads; about 250 sq.m.; pop. '71, 17,634. The surface is diversified. The soil is fertile. The principal productions are corn, wheat, and oats. Capital, Sainte Marie de Monnoir.

ROUX. The name of a material used by cooks to thicken soups and gravies; it is made either white or brown. The former is prepared by putting a quantity of butter into a well-tinned stew-pan, and dissolving it gently over the fire. It is kept over the fire until it begins to simmer, when fine flour is dusted in with a dredge, and carefully incorporated, the flour being added until it is sufficiently thickened. It is then poured into a jar, and is ready for use. The brown is made in the same way, except that it is kept a longer time over the fire, which gradually gives it a rich brown color.

ROVE BEETLE, or Cocktail, *Staphylinus*, a genus of coleopterous insects, the type of a family, *staphylinidæ*, to very many of which the same English names are often extended; belonging to the section *coleoptera pentamera*, and tribe *bræchelytra*, of which a chief charcteristic is the short square elytra, which leave the greater part of the abdomen exposed. The abdomen is soft and flexible, and these insects have a habit of turning up the point of it, particularly when annoyed, whence the name *cocktail.* They feed on carrion; their larvæ, however, not unfrequently choose vegetable food, as young wheat, cutting the stem underground with their strong mandibles. The bite of some of the species is apt to cause bad sores. The species are numerous. Many of them have a fetid odor; a few have odors resembling those of fruits and flowers.

ROVERE'DO, a city of Austria, in the Tyrol, occupies a most beautiful and picuresque site in the Lagerthal, on the banks of the Leno, and close to the left bank of the Adige, 12 m. s. of Trient by railway. Roveredo, one of the most flourishing towns in the Tyrol, is the center of the silk-trade. It contains 60 factories, in which 2,300 hands are employed, and carries on besides some trade in wine and an active transit-trade. Pop. '69, 9,063. Roveredo was the scene of a battle between the French and Austrians on Sept. 3 and 4, 1796, in which the latter were defeated.

ROVIG'NO, a trading-t. and seaport of Istria, stands on a rocky promontory which forms a double harbor 45 m.s. of Trieste. The best Istrian wine is grown in the vicinity, which is also abundantly productive in oil: 30,000 casks of olive oil are exported annually; and ship-building, the usual manufactures to which a seaport gives rise, and the tunny and sardine fisheries are the chief branches of industry. Pop. '69, 9,564.

ROVI'GO, a province in n.e. Italy, bounded by the Adriatic and by Padua, Venice, Verona, Mantua, and Ferrara; traversed by the Po and the Adige; about 650 sq.m.; pop. about 200,000. The surface is somewhat irregular. The soil is fertile. The principal productions are corn, wheat, wool, flax, hemp, and silk. Capital, Rovigo.

ROVI'GO, a city in Italy, capital of the province of the same name, on the Adigetto, 38 m. s.w. of Venice. It is a handsome fortified city; has a cathedral, which contains some fine paintings, and a picture-gallery. The staple produce of the neighborhood is grain and wine. Pop. 7,500.

ROVING. See Spinning.

ROVU'MA, a river of s.e. Africa, which enters the Indian ocean by a spacious bay n. of cape Delgado. Only a small portion near its mouth was known to Europeans till 1861, when Drs. Livingstone and Kirk attempted its ascent in the small steamer *Pioneer*, drawing five feet water. The river was then in flood, and had a strong current. After an ascent of 30 m. the difficulties of the passage induced the explorers to return. Another ascent was made by the same party during the dry season of 1862. With two ship's boats they reached the rapids which limit the navigation, above 100 m. from the coast, and half way to the Nyassa lake.

Passing through gloomy, unhealthy forests of mangroves, they entered a healthy plain, covered with heavy timber and brilliantly flaming tropical plants; but the country was infested by the "tsetse fly," a serious obstacle to its development. The river abounded with hippopotami. The travelers came within two days of the town of N'gomano, where all the caravans cross the Rovuma, but could not leave the boats in order to reach it. Here the Rovuma is joined by the Niende, a large affluent from the hills on the s.w.; while the main stream comes from the w. and n.w. As the Rovuma is navigable for only a few months of the year, it offers little advantage for commerce; but it affords an excellent entrance by which to explore the regions between the Nyassa and Tanganyika lakes. During his last African journey Dr. Livingstone and his party left Zanzibar in Mar., 1866. Owing to the swampy state of the country the party landed 25 m. n. of the Rovuma, and striking s.s.w across the country to that river, followed it to the point where it is joined by the Leonde from the mountains on the s.w., near the eastern shore of lake Nyassa. On their arrival at N'gomano, the travelers found the country destitute of provisions, a tribe of Mazité having swept away all the food found above ground. Dr. Livingstone proposed to establish the base of his operations at N'gomano till he could find his way round the Nyassa; and the last authentic news of him received for a long time was from a letter dated thence on the 18th May, 1866. See Livingstone for the proceedings of that great traveler from the time he was at N'gomano till his death in 1873.

ROWAN', a co. in n.e. Kentucky; drained by the Licking river, its s.w. boundary, and by Triplett creek; 370 sq.m.; pop. '80, 4,419—4,398 of American birth; 105 colored. Surface hilly, and heavily wooded; corn, wheat, grass, and pork, are the chief products. Cattle raising is extensively carried on. Co. seat, Morehead.

ROWAN', a co. in central North Carolina; drained by the Yadkin and smaller rivers; traversed by the North Carolina railroad and its western branch; 550 sq.m.; pop. '80. 19,917—19,876 of American birth; 6,306 colored. The surface is hilly and not very fertile; corn, tobacco, wheat, oats, and pork are the staples. Granite is found. Co. seat, Salisbury.

ROW'AN, JOHN, 1773–1843; b. Penn., removed with his parents to Kentucky in 1783. His early studies were directed by Dr. Priestley at Bardstown; he was admitted to the bar 1795. In 1799 he was a delegate to the state constitutional convention, secretary of state 1804; member of congress 1807–09. He was a member of the state legislature for a number of years; judge of the court of appeals; U. S. senator 1825–31. He was unrivaled in his state as a pleader in criminal cases, and by his eloquence compelled conviction in debate, as in the court room.

ROW'AN, STEPHEN C., b. Ireland, 1808; entered the U. S. navy as midshipman 1826, rose through successive grades to rear-admiral 1866, He was prominent in the battle of Niesa, upper California; at the bombardment of Guaymas, in command of the *Cyane;* and in the war of the rebellion in command of the *Pawnee* at Acquia creek, and in the capture of Hatteras. He commanded the small fleet in the attack on Roanoke island, and in Albemarle sound his command assisted in the destruction of the confederate fleet, and took part in the victories in North Carolina. In Charleston harbor he commanded *The New Ironsides;* and was assigned to the command of the Asiatic squadron 1868–69. For valor and service he was made vice-admiral 1870.

ROW'AN TREE, MOUNTAIN ASH, or QUICKEN TREE, *Pyrus aucuparia* (*Sorbus aucuparia* of many botanists), a tree abundant in Britain, especially in the highlands of Scotland, and in many parts of continental Europe. It does not attain a great size, has in general a very straight erect stem, and is distinguished from the other species of pyrus (q.v.) by pinnated glabrous leaves, terminated by a single leaflet, serrated leaflets, corymbs of small flowers, and small globose fruit. The wood is valued for its compactness. The inner bark and sapwood have a very peculiar smell. In the superstitions of the Scottish highlands, and also of the lowlands, a peculiar importance was assigned to the rowan tree, a mere twig of which was supposed to have great efficacy in scaring away evil spirits. It is very ornamental, especially when in fruit. The fruit (*rowan berries*) is sometimes used for preserves. It has much acidity and a peculiar bitterness. It is generally red but there is a variety with yellow fruit; and a very nearly allied species, *P. Americana*, a native of North America, has purple fruit.

ROWE, ELIZABETH, 1674–1737; b. Ilchester, England. She was distinguished for her elegant writings, personal accomplisments, and benevolence. She published *Poems on Several Occasions, by Philomela; Letters, Moral and Entertaining in Prose and Verse; Joseph, a Poem; Friendship in Death; Devout Exercises of the Heart,* published by Dr. Isaac Watts after her death. *Miscellaneous Works in Prose and Verse,* 2 vols.

ROWE, NICHOLAS, a dramatic poet and translator, the contemporary and friend of Congreve, Addison, Steele, and the other wits of the queen Anne period, was the son of a sergeant-at-law, and was born at little Barford, in Derbyshire, in 1673. He was educated at Westminster, and studied law in the middle temple; but inheriting a small competency by the death of his father, he devoted himself to literature. Between 1700 and 1714 he produced eight plays, of which three were long popular, viz.—*Tamerlane,* 1702; *The Fair Penitent,* 1703; and *Jane Shore,* 1714. The character of Lothario in the *Fair Penitent* was the prototype of Lovelace in Richardson's *Clarissa Harlowe,* and the name is still the synonym for an accomplished rake. Rowe translated Lucan's *Pharsalia,* and his translation was so highly valued that after his death his widow received a pension expressly on account of this service to literature rendered by her husband. He was also the first editor of Shakespeare, 1709. The popular talents and engaging manners of Rowe procured him many friends, and he was appointed to several lucrative offices. The duke of Queensberry made him his under-secretary of state. In 1715 he succeeded Tate as poet-laureate, and the same year he was appointed one of the land-surveyors of the customs of the port of London; the prince of Wales made him clerk of his council; and the lord chancellor Parker created him clerk of the presentations. He died Dec. 6, 1718, and was buried in Westminster abbey. As a dramatist, Rowe is characterized by an easy and elegant style of diction and versification, but is destitute of originality, subtlety, or force in the delineation of character or passion. In the construction of his dramas, "there is not," as Johnson remarks, "much art:" but there is no gross violation of taste or decorum, and he excels in scenes of domestic tenderness

ROWING (BOATING, *ante*). The history of rowing as a pastime in the colleges of the United States began at Yale in 1843 and at Harvard in 1844, and the first intercollegiate boat-race took place on Aug. 3, 1852, on Lake Winipiseogee, N. H. It was in eight-oared barges, carrying coxswains, over a two-mile course, and was won by Harvard, being two lengths ahead at the finish. In 1855 Harvard was again victorious over Yale. This race took place on the Connecticut river near Springfield, over a three-mile course. The next race occurred in 1859 at lake Quinsigamond, near Worcester, Mass., between Harvard, Yale, and Brown, in six-oared shells over a three-mile course, and was won by Harvard in 19 minutes and 18 seconds. But on the day following Harvard was beaten by Yale by 2 seconds in a regatta thrown open by the citizens of Worcester. In 1860, in a race over the same course, Harvard won in 18 minutes 53 seconds. The war interrupted these races till 1864, when Yale beat Harvard at lake Quinsigamond, repeating the victory in 1865; but was beaten by Harvard over the same course five years in succession, 1866–70. In 1868 Harvard rowed the three miles in 17 minutes 48½ seconds, and in 1869 rowed on the Thames against an Oxford four-oared crew and coxswain, but was beaten by 1¼ length, being compelled on the day of the race to supply the places of two of her best men with substitutes. In 1871 an intercollegiate three mile race took place on the Connecticut river near Springfield between Harvard, Brown, and the Amherst agricultural crew, and was won by the latter in 16 minutes 47 seconds. In 1872 six colleges participated in this race, and it was won by Amherst in 16 minutes 83 seconds. In 1873 there were 11 colleges, Yale coming in ahead of all the rest in 16 minutes 50 seconds. In 1874 the intercollegiate race was rowed between 9 colleges on Saratoga lake, and was won by Columbia in 16 minutes 32¾ seconds. In 1875 there were 10 colleges competing, and Cornell won the race in 16 minutes 53¼ seconds, with Columbia second, Harvard third. On July 19, 1876, the last of these races took place at Saratoga lake. Only 6 colleges participated, and it was won by Cornell in 17 minutes 1¼ seconds, with Harvard second, Columbia third. Previous to this Yale and Harvard returned in a measure to the methods of 1854. In their race of that year, which was held June 30, 1876, Yale rowed over the course in 22 minutes 2 seconds, with Harvard 13 lengths behind. In the intercollegiate contest of the centennial regatta at Philadelphia the race was won by Yale in 9:10¾, with Columbia second, 9:21; the Cambridge crew came in last, having thrown up their oars half a mile from the finish, owing to the illness of their captain. It was rowed Sept. 1 on the Schuylkill, 1½ m. from the Falls bridge to Rockland landing. The international race for four-oared shells was rowed over the same course, and was begun on Aug. 28, 1876. In this race the crews rowed in batches of two and three, there being seven of these preliminary heats. In the first the Atlantas withdrew, and the Dublin university men were beaten by the Eurekas of Newark, N. J. The winners of the seven heats and the time made were as follows: Eureka, 9:29½; Yale, 9:2¾; Columbia, 9:11; Beaverwyck, 9:14; Watkins, 9:6¼; London, 8:55; Cambridge, 9:6¾. In the three heats of Aug. 29, between the winners of the day previous, the victors were London, 8:51½; Watkins, 9:1¾, and Beaverwyck, 9:7. Yale was beaten only by half a length by the four of the London rowing club (considered the first rowing organization in the world), and made the best time for American four-oared boats in the regatta, 8:52¼. The result of the final heat was a great surprise, the Beaverwycks of Albany beating the London crew by a quarter of a length, with Watkins only three lengths behind, in the comparatively slow time of 9 6. This was 14¾ seconds slower than London, and 13¾ seconds slower than Yale made in their contest the day previous. On Sept. 4 the London won a race against a New York crew over the same course, rounding the stake-boats, and returning to the start, making a distance of three miles. The time of London was 18:21½; New York, 18:37. In a second race on the same day the Paris crew of St. John's, N. B., who won the championship of the world on the Seine in 1867, were badly beaten by a raw crew of Halifax fishermen, who rowed over the same course in 17:58. In 1877 Harvard won a race against Columbia, and in the four-mile race at New London Harvard won in 24:36; Yale, 24:43. In 1878, over the same course, Harvard won in 20:44; Yale, 21:29, but was beaten at Lake Owasco by Cornell, 17:13¾; Harvard, 17:27¾. In the same year Columbia sent a crew to England to compete for the Visitors' challenge cup, consisting of J. T. Goodwin, C. Edson, H. E. Fidabock, E. E. Sage, and Mr. Eldridge as substitute. The Shoewaecaemettes, a Michigan crew, crossed the ocean to compete for the Steward's challenge cup. On the first day each American crew won a heat. In the final heat for the Visitors' challenge cup on July 5, 1878, the Columbia crew won easily in 8:41; but the Michigan crew was beaten by the London rowing club in 8:26, the Shoewaecaemettes being compelled to stop before the finish, on account of the sickness of Joseph Nadeau. In 1879 Columbia won the college regatta at lake George, but was beaten at Philadelphia. The race at New London was easily won by Harvard in 22:15. In 1880 Yale won the race over the same course in 24:27; Harvard, 25:9. The second annual regatta on the Schuylkill river was won by Columbia in 9:4¾ against the crews of Princeton and the university of Pennsylvania; but the two-mile freshman race at New London was won by Harvard in 11:32; Columbia, 11:37. The Atlanta boat club was organized in 1848, and at the present time there are over 400 rowing organizations in the United States. In 1879 Edward Hanlan beat Elliott on June 16, and Charles Courtney on Oct. 16. In 1880 Hanlan beat Courtney in a five-mile race in 36 minutes 46 seconds on May 19, and won a race with James Riley for the same distance in 36 minutes $2\frac{3}{10}$ seconds on May 26. He was beaten in a race with Wallace Ross June 17, but beat Trickett Nov. 15. Trickett was also beaten by Wallace Ross Dec. 4.

ROWLANDSON, Mary (White). b. Mass., 1636; married the rev. Joseph Rowlandson, minister, of Lancaster. In 1676 the Indians attacked and burned that town, and carried off her and her children, who were ransomed by some ladies in Boston, after a captivity of about 8 months. In 1682 she published a narrative of her captivity.

ROWLEY, William, b. England, in the 17th c.; educated at Cambridge. He was a member of the royal company of players, and an excellent comic actor. He published a number of comedies of his own, and others in connection with Middleton, Heywood, and Massinger.

ROWSON, Susanna (Haswell), 1762–1824; b. England; her childhood was spent in New England, but her father, a former British naval officer, returned to England on the outbreak of the revolution. Susanna became an actress, came to America in 1793, played at Boston with great success, taught school for several years, and published several dramas and operas and a long series of novels, of which *Charlotte Temple* became highly popular, and is the only one now read.

ROXBURGH, a co. in Scotland, comprising the districts of Teviotdale and Liddesdale, with part of Tweeddale, extending in length about 40 m., and in breadth 28 to 30 m., is bounded on the e. and s. by Northumberland and Cumberland; on the s.w. by Dumfriesshire; on the w. by Selkirk; and on the n. by Berwickshire. The physical aspect of the county is varied and picturesque, having the Cheviot and Lauriston hills bounding a considerable portion of its borders. The Cheviots do not rise to any great height, the highest not exceeding 2,000 feet. The herbage is green to the summit, and affords valuable pasture to sheep. The interior of the county is generally composed of good soil; and the farms being mostly large, and held by men of capital and skill, it is farmed to the greatest advantage. The chief river is the Tweed, which flows through the northern districts of the county. The Teviot runs through the county a distance of 40 m., and falls into the Tweed at Kelso. There are several other streams of note, the Allan, the Slitrig, the Jed, the Gala, etc.

Roxburgh possesses an interesting history in connection with border feuds of former days; and it has many magnificent remains of monastic life and institutions, which, with its many legends and traditional stories, render it of much interest.

The proprietors are not numerous—the dukes of Roxburghe and Buccleuch, the marquis of Lothian, the earl of Minto, and a few others holding a great proportion of it. The area is 670 sq.m., or 428,494 acres. To the eye of a traveler Roxburgh is the county of Perth in miniature. The valued rent of it in 1674 was £26,222 sterling; the new valuation for 1875–76 was £420,161, including railways. In 1876 the total acreage under all kinds of crops, bare fallow, and grass, was 174,525; there was of wheat, 1165 acres; of barley, 16,456; of oats, 32,737; rye, 124; beans, 520; peas, 75. The total number of acres under corn crops was 51,077. The parliamentary constituency in 1875–76 was 1860. Pop. '61, 54,119; '71, 53,965. The county town is Jedburg.

ROXBURGHE CLUB, a society of very considerable literary interest, called after John, duke of Roxburghe, the celebrated collector of ancient literature. After the death of the duke, who died in 1805, his valuable library, rich in the old romances of chivalry and early English poetry—a very fine treasury in its way—was, in 1812, brought to that hammer which almost always in an unmerciful manner scatters the gatherings of book-collectors, and the large prices realized for some of the books were unprecedented. As a specimen, it may be stated that a copy of the first work printed by Caxton in 1471, the *Recuyell of the Historyes of Troye*, sold for £1050 10s. The largest sum, however (and perhaps the greatest ever paid for a single printed volume up till that time), was given by the marquis of Blandford (afterward duke of Marlborough) for the first edition of Boccaccio's *Decameron*, which fetched £2,260. In commemoration of the interest which the sale of this collection occasioned among literary antiquaries, the Roxburghe club was instituted, for the purpose of printing a limited number of impressions of MSS. and rare works for the use of its members, to whom they are strictly limited. The Roxburghe club has in this way issued upward of 80 very curious and interesting works, which are only, however, to be found in the collections of the members, or in a few of the larger public libraries. On the anniversary (June 17) of the sale of the copy of Boccaccio's *Decameron*, above referred to, the club holds a symposium in London.

The Roxburghe club may be regarded as the parent of many literary societies subsequently founded for similar purposes, among which may be mentioned the Camden, Percy, Shakespeare, Cheetham, Wharton, and Surtees societies in England; the Bannatyne, Maitland, Abbotsford, and Spalding clubs in Scotland; and the Celtic society in Ireland. The labors of these bodies in printing MSS. and fugitive black-letter tracts have added many important contributions to British literature.

ROXBURGHIA'CEÆ, a natural order of plants, belonging to the dictyogens (q.v.) of Lindley, twining shrubs with reticulated leathery leaves; and large, showy, solitary, fetid flowers; the perianth of 4 divisions, the stamens 4, hypogynous, the ovary 1-celled, the ovules numerous; the pericarp 1-celled, 2-valved, with 2 clusters of seeds at the base; the seeds attached to long cords. The species are very few, natives of the hotter parts of the East Indies. The stems of *Roxburghia viridiflora*, a native of Chittagong, the Malayan islands, etc., are sometimes 100 fathoms long. The roots are boiled and soaked in lime-water to remove their acridity, and are then preserved in syrup, and eaten.

ROXBURY, formerly a separate city of Massachusetts, but now incorporated with Boston, built upon hills and in hollows, which give it fine building sites and attractive scenery. Besides numerous elegant residences, churches, schools, banks, and newspapers, it contains many forges, steam-engine and boiler factories, cordage-mills, and manufactories of cotton, wool, carpets, flax-cotton, organs, starch, glue, etc. Pop. '70, 34,772.

ROXBURY (*ante*), on the Boston and Providence railroad, and now known as Boston Highlands, is about 3 m. s. of Boston proper, with which it is connected by

"Boston Neck." It occupies an irregular and picturesque surface, some of which commands a good view of the city proper. It is a favorite place of residence, and contains many handsome villas and residences, a large portion of which are surrounded by spacious lawns, gardens, and by shrubbery. It has about 40 churches, 4 banks, 2 newspapers, several Roman Catholic reformatory institutions, and a nunnery. The manufacturing industries are extensive, including great breweries, foundries, tanneries, the extensive works of the Whittier machine company, beef-packing establishmenst, manufactories of locomotives, fire-engines, watches, soap and candles, phosphates, etc. On the Dedham turnpike lies the Forest Hills cemetery, comprising some 150 acres, beautifully laid out, and entered through an Egyptain gateway. Roxbury was settled in 1629, and included among its early inhabitants John Eliot and gov. Joseph Dudley. It was the birthplace of gens. Joseph Warren and Heath. In 1775 it was the site of a fort built by the Rhode Island troops, which did considerable damage to the British in Boston, and was called by Washington the best within the lines of siege. The Roxbury Latin school, established in 1642, endowed by Thomas Bell in 1645, has a high reputation. Roxbury received a city charter in 1846, and was annexed to Boston in 1868.

ROY, WILLIAM, Maj.gen. in the British army, was born May 4, 1706, at Milton Head, in the parish of Carluke, Lanarkshire. His early history is quite unknown, and the incidents of his professional career comparatively unimportant, but his name will always be remembered by succeeding generations as that of the first of British geodesists. After the great rebellion in 1745, he was employed in preparing for government a map of the Highlands, and finally of the whole mainland, which, however, owing to imperfect instruments, and the hurried nature of the survey, was only, to use Roy's own words, "a magnificent military sketch." Roy's next important operation was the measuring a base line (see ORDNANCE SURVEY) on Hounslow Heath, of 27,404¾ ft., or about 5¼ m., which, though the first measurement of the kind in Britain which pretended to accuracy, was executed with such care, that, on being remeasured after Roy's death, the difference between the two results was found to be only 2¾ inches. For this splendid labor, Roy received the royal society's Copley medal. Roy's labors connected with the survey extended from July, 1787, till Sept., 1788, when he returned to London in ill health, which necessitated his removal to the warmer latitude of Lisbon in the winter of 1789; but he returned to London in the following April, and died there July 1, 1790. In 1767 Roy was elected a fellow of the Royal society, to whose *Transactions* he contributed, in 1777, a paper entitled "Experiments and Observations made in Britain, in order to obtain a Rule for Measuring Heights with the Barometer." He had also, during his survey of Scotland, paid particular attention to the camps and other Roman remains in that country, and had completed an elaborate work on this subject, illustrated by drawings and plans, and by a copy of his map of the country. This work was published (1793) by the society of antiquaries (of which Roy had been a member), to whom it had been presented by Roy's executors. Roy was also surveyor-general of the coasts of Great Britain.

ROYAL ACADEMY OF MUSIC, an institution founded in 1823, by a number of musical amateurs, headed by the earl of Westmoreland, for the purpose of affording to a certain number of pupils the opportunity of obtaining a first-rate musical education, and of enabling those who make music a pursuit to provide themselves with the means of honorable livelihood. The academy is chiefly supported by contributions and subscriptions, the subscribers and contributors being divided into four classes, of whom the first three recommend and elect the students. A small sum is voted yearly by parliament for its maintenance. Of the scholars, some are boarders and some out-door pupils. The pupils are placed under the tuition of chosen instructors in every branch of musical education. The academy was incorporated by royal charter in 1830. Since its foundation, a number of its pupils have gone forth to the world as musicians of eminence, including among others Sir W. Sterndale Bennett, Messrs. G. A. Macfarren (who is now principal of the academy), A. Sullivan, Blagrove, Brinley Richards, Mme. Sainton-Dolby, Miss Loder, etc. Concerts are given by the pupils, to which the public are admitted. See Cazalet's *History of the Royal Academy of Music* (Lond., 1854).

ROYAL ASSENT. See PARLIAMENT.

ROYAL FAMILY. In its more restricted signification, the royal family of Great Britain only includes the queen-consort and queen-dowager, and the children or other descendants of the sovereign. In a larger sense, it comprehends all the British descendants of the royal house, or perhaps, more properly, as indicated by Blackstone, all who may by possibility succeed to the throne. With regard to the position and rights of a queen-consort and queen-dowager, see QUEEN. The husband of the queen-regnant is not as such a member of the royal family; but the style of royal highness, and a precedence next to her majesty, were conferred on the late prince-consort by statute. The prince of Wales (q.v.), or heir-apparent to the throne, and the princess of Wales, are distinguished by law from the rest of the royal family. By the statute 25 Edw. III., to compass the death of the prince of Wales, or violate the chastity of the princess of Wales, is high treason. The eldest daughter of the sovereign is styled the princess royal, and the violation of her chastity is, by the same statute, high treason. The heir-presumptive to the throne has no special rank or precedence as such, as his position may be altered by the birth of an heir-apparent.

The younger sons and daughters of the sovereign are entitled to a peculiar place in the house of lords; statute 31 Henry VIII. c. 10 enacts that no person except the king's children shall presume to sit or have place at the side of the cloth of estate in the parliament chamber. On a reference by George II. to the house of lords regarding the position and precedence of Edward duke of York, second son of his son Frederick prince of Wales, it was held that, under the description of the king's children, grandsons are included.

On a reference made to all the judges by George I., it was resolved that the education and care of the king's grandchildren, when minors, and also the approval of their marriages, belongs to the king, even during their father's lifetime. This care and approval has more recently been held to extend to the heir-presumptive, and it is difficult to say how far it comprises also the remoter branches of the royal house. There are frequent instances of the crown's interposition in the case of nephews and nieces, and a few in the case of more distant collaterals. Questions regarding the marriages of the royal family are now further regulated by the royal marriage act (q.v.). The prince of Wales, besides the revenues of the duchy of Cornwall, has settled on him, by 26 Vict. c. 1, an annuity of £40,000, and the princess of Wales £10,000, to be increased to £30,000 in case of her widowhood.

On the consolidated fund are charged £25,000 to the duke of Edinburgh, £25,000 to the duke of Connaught, £15.000 to prince Leopold, £8,000 to the crown princess of Prussia (till 1879, £6,000 to the grand-duchess of Hesse), £6,000 to princess Christian of Sleswick-Holstein, £6,000 to the marchioness of Lorne, £6,000 to the duchess of Cambridge, £3,000 to her daughter, the grand-duchess of Mecklenburg-Strelitz, £12,000 to the duke of Cambridge, and £5,000 to princess Teck, formerly princess Mary of Cambridge.

ROYAL GEORGE, a British man-of-war, of 108 guns, the sudden sinking of which in Portsmouth harbor with all on board, Aug. 29, 1782, created a wide-spread feeling of sorrow and commiseration. The *Royal George* was the principal vessel of lord Howe's fleet, and while she was undergoing repairs near the keel, she was too much heeled over, so that the water rushing through the port-holes of the depressed side, speedily filled her, and she sank with all on board, including the admiral, Kempenfeldt, the captain, officers, crew, and about 300 women and children, who happened to be on board at the time—1100 in all. Of these, however, 200 were saved; but a small vessel, which happened to be anchored near, was drawn into the vortex occasioned by the *Royal George's* descent, and swallowed up; and other vessels were also placed in imminent danger. Captain Waghorn, who escaped, was subsequently tried by court-martial for negligence and carelessness in the careening operation, but was acquitted. This calamitous event has been celebrated in an elegy by Cowper. Many of the guns were fished up soon afterward, and several schemes were projected for the raising of the ship bodily, but without success, until, in 1839, the mass was blown to pieces by the explosion of large metal cases filled with gunpowder. Most of the valuables which had been in the ship were brought up, and the brass guns which were recovered sufficed to defray the cost of the operation.

ROYALL, Isaac, d. 1781, b. Mass.; represented the town of Medford in the general court, and was for many years a member of the executive council. He served in the French war, was appointed brig.gen. in 1761, and went to England in 1775, being a partisan of the crown. His estate was confiscated in consequence, and he was proscribed. Nevertheless, at his death, he left 2,000 acres of land in Worcester co. to endow at Harvard college a law professorship, which bears his name, as does the town of Royalston, of which he was a proprietor.

ROYAL MARRIAGE ACT. Act 12 Geo. III. c. 2 enacts that no descendant of the body of Geo. II., other than the issue of princesses married into foreign families, shall be capable of contracting marriage without the previous consent of the sovereign, signified under the great seal; and any marriage contracted without such consent is declared void. But such descendants, if above the age of 25, may, after 12 months' notice given to the privy council, contract and solemnize marriage without consent of the crown, unless both houses of parliament shall, before the expiration of the year, expressly declare their disapproval of such intended marriage. The penalties of præmunire (q.v.) are attached to all persons who shall solemnize, assist, or be present at any such marriage. This act was passed in consequence of the marriage of the duke of Gloucester, brother of George III., with the countess dowager of Waldegrave, and of the duke of Cumberland with the widow of col. Horton and daughter of lord Irnham. The marriage of the late duke of Sussex in 1793 to lady Augusta Murray, daughter of the earl of Dunmore, was declared by the prerogative court to be a violation of the royal marriage act, and therefore null and void, in Aug., 1794; and the claims of their son, sir Augustus d'Este, were declared invalid by the house of lords in 1844. The royal marriage act is heartily disapproved by many as impolitic and despotic, and as tending to immorality and scandalous conduct, and was not passed without great resistance in parliament. But the influence of the government was then too strong for public opinion.

ROYAL-MAST, the fourth mast from the deck, and usually the highest carried. It is most commonly made in one piece with the top-gallant-mast. It carries the royal-yard, which bears a sail called the "royal." The royal-mast is surmounted by the truck, at which the pendant or other flag is displayed when necessary.

ROYAL SOCIETY (OF LONDON). The origin of this society may be traced back to those stirring years of civil strife that brought in the commonwealth. Clubs for political, theological, and sectarian purposes were then numerous and active; and in the year 1645, "divers worthy persons, inquisitive into natural philosophy, and other parts of human learning, did, by agreements, meet weekly in London on a certain day, to treat and discourse of such affairs." Among these worthy persons were certain medical men, Dr. Wilkins, afterward bishop of Chester; Foster, professor of astronomy in Gresham college; Wallis, the mathematician; and others, including a learned German from the palatinate; and out of their meetings arose the now world-famous Royal society. Wallis records that the subjects discoursed of were "the circulation of the blood; the valves in the veins; the venæ lacteæ; the lympathic vessels; the Copernican hypothesis; the nature of comets and new stars; the satellites of Jupiter; the oval shape of Saturn; the spots in the sun, and its turning on its own axis; the inequalities and selenography of the moon; the several phases of Venus and Mercury; the improvement of telescopes, and grinding of glasses for that purpose; the weight of air; the possibility or impossibility of vacuities, and nature's abhorrence thereof; the Torricellian experiment in quicksilver; the descent of heavy bodies, and the degrees of acceleration therein; and divers other things of like nature."

In 1662 the persevering philosophers were, through the "grace and favor" of Charles II., incorporated by charter, in which they were described as the Royal society of London for the promotion of natural knowledge. The king gave them also a mace, and subsequently granted two other charters conferring additional powers and privileges. They are inscribed in a handsome volume known as the charter book, which, containing, as it does, the sign-manual of the founder, of other royal personages, and of nearly every fellow elected into the society, presents a collection of autographs unequaled in the world.

Through many difficulties, the young society pursued their way. Their meetings were interrupted by the great fire and the plague; but in March, 1664–65, they published the first number of the *Philosophical Transactions*, and thus commenced a record of their labors and researches, and at the same time a history of science of the highest value, comprising upward of 160 quarto volumes. Besides this, the society publish an octavo serial entitled *Proceedings*, in which an account of the ordinary meetings is set forth. This serial was commenced in 1800, and now fills about 30 volumes. Another publication, in 8 large quarto volumes, is the *Catalogue of Scientific Papers*, containing the titles of scientific papers published in all parts of the world from 1800 to 1873. This great work, invaluable for purposes of reference, was compiled at the cost of the society, and gives in methodical form a record of the scientific progress of 73 years of the century. These works are not restricted to the fellows, but are sold to the general public.

By increase of numbers—including scientific men on the continent, who were elected as foreign members—the society widened their sphere of usefulness. They promoted the publication of Newton's *Principia* and optical works; they lent instruments to Greenwich observatory in its early days, and were appointed visitors of that establishment by queen Anne—a function which they still exercise; they aided travelers and scientific investigators; through force of circumstances they became the advisers of the government on scientific subjects; Cook's celebrated voyage to observe the transit of Venus was undertaken at their instance; and from the voyage of the *Endeavor* down to the voyage of the *Challenger*, it would be difficult to specify a scientific expedition which had not been equipped under the advice of the Royal society.

In 1710 the society removed to a house which they bought in Crane court, Fleet street. In 1780, by order of George III., quarters were assigned to them in the then new palatial building, Somerset house. There they abode until 1857, when, at the request of the government, they migrated westward to Burlington house, a wing of which they now occupy.

The society's session commences on the third Thursday in November, and ends on the third Thursday in June. During this period meetings are held weekly at 8.30 P.M. for the reading and discussion of papers, and these papers are for the most part afterward published in the *Proceedings* or the *Philosophical Transactions*. The anniversary meeting is held on Nov. 30. At that meeting the society elect a council to carry on their work through the ensuing year. This council, comprising president, treasurer, and secretaries, numbers 21 persons.

The number of candidates for election into the society averages between 50 and 60 every year. From these the council select 15, whose names are printed and sent to every fellow, and in June the annual meeting takes place at which the 15 are elected; but any fellow is at liberty to alter the list of names. There are in all about 560 fellows, including 50 foreign members.

The society's income is derived from funded and landed property, and the annual contributions of the fellows. Each fellow contributes £4 yearly, or pays a life-composition of £60, with an admission fee of £10. These payments entitle him to the *Philosophical Transactions* and *Proceedings*, and to the use of the library of 30,000 volumes. The fund raised for the abolition of admission fees and the reduction of the annual contributions to £3 amounted in 1879 to £10,000.

The society undertakes the administration of the £1000 annually voted by parliament for scientific purposes; also assists in the administration of an additional £4,000 voted (1876–80) for the same purpose. The society also assists in the naming of the meteorological council, which (1879–80) received a government grant of £14,500.

In fulfillment of trusts, the society award annually, in recognition of scientific work and discoveries, the Copley medal and two royal medals; and the Rumford medal every two years for researches in light or heat. To these has been added the Davy medal for chemical investigations.

The most illustrious names in the annals of science appear on the roll of presidents of the royal society.

ROYAL SOCIETY (OF EDINBURGH) was incorporated by royal charter in 1783. It owed its origin to principal Robertson, the historian, who successfully labored to found in Edinburgh a society on the model of the Berlin academy, for the investigation and discussion of subjects in every branch of science, erudition, and taste. The society was formally constituted at a meeting held in the college library on June 23, 1783, where the subsequent meetings were held till 1810, when the society purchased a house in George street. In 1826 the society removed to its present apartments, leased from government, in the royal institution building in Princes street. The original list of members included the names of most of the literati of Scotland. The first president was Henry, duke of Buccleuch. He was succeeded in 1812 by sir James Hall, who, resigning in 1820, was succeeded by sir Walter Scott. On the death of sir Walter in 1832, sir Thomas M'Dougall Brisbane was appointed president; and was succeeded in 1860 by the duke of Argyle. In 1864 sir David Brewster, K.H., became successor to the duke, on whose death, in 1868, sir R. Christison was elected. In 1873 sir William Thomson was elected, and held that honorable office for a period of five years.

The meetings of the society are held on the 1st and 3d Mondays of every month from November to June. The admission fee of resident fellows is £2 2s., and the annual contribution is £3 3s., which, after 10 years, is reduced to £2 2s., and ceases after 25 years' membership. The society is also assisted by an annual grant of £300 voted by parliament. The papers read before this learned body are published in its *Transactions*, of which 26 volumes have been published in quarto. Abstracts of the papers also appear in its *Proceedings*, of which 7 volumes have appeared in octavo.

The number of *ordinary* fellows is upward of 370; and of *honorary* fellows, near 60.

The society has the disposal of some valuable prizes, which are bestowed on the authors of the best communications on scientific and other subjects. These are the Keith prize, founded by Alexander Keith of Dunnottar; the M'Dougall Brisbane prize, founded by sir Thomas M. Brisbane; and the Neill prize, founded by Patrick Neill, esq., LL.D.

ROYER-COLLARD, PIERRE-PAUL, a French statesman, b. June 21, 1763, at Sompuis (Marne). The childhood of Royer-Collard was spent at his father's house, under the severe surveillance of his mother, who belonged to a family ardently devoted to Jansenism. He was sent to college at Chaumont, and afterward at Saint-Omer, which was superintended by one of his uncles, the abbé Collard. Having passed as advocate at an early age, he pleaded several times before the old parliament; but from the first days of the revolution he was involved in the events of that time, having been elected one of the representatives of the commune of Paris. From 1790 to 1792 he acted as joint-secretary of the municipality. It was then that he was connected with Pétion and Danton. The events of May 31 obliged him to remove from Paris. He then returned to Sompuis, and lived in obscurity during the whole time of the reign of terror, studying and following the plow himself, to evade the suspicions of the Jacobins. Three years afterward, in 1797, the electors of this department chose him to represent them in the council of the five hundred. Royer-Collard took an active part in the work of that assembly. He was one of those honest men who, preferring monarchy, but fearing a violent counter-revolution, consented to try the republic with a moderate government, cherishing the hope, in the mean time, of an ultimate restoration. The 18th Fructidor completely opened his eyes and dispelled his illusions. It was then that he turned his thoughts to what he believed to be the only hope of France, and that he began a correspondence with Louis XVIII., which, however, ceased toward the epoch of the establishment of the empire. For some years afterward he ceased to have anything to do with politics, and entered on another career. He was offered the chair of philosophy (1809) by Napoleon in the recently created university of France, which he accepted after great hesitation. Applying himself vigorously to study for it, he was soon highly qualified to fulfill his duties. In the few years he occupied this chair, he exercised an immense influence on the philosophy of France. Rejecting the purely sensuous system of Condillac, he proceeded eclectically, giving special prominence to the principles of the Scottish school of Reid and Stewart. He originated the "Doctrinaire" school, of which Jouffroy and Cousin were the chief representatives.

The restoration deprived the cause of education of the services of Royer-Collard. The Bourbons did not overlook the man who had not ceased, since 1798, to maintain their cause; but Royer-Collard, who had all along dreamed of the union of hereditary monarchy with an enlightened liberty, was ill-fitted to act with the royalist fanatics now dominant in France.

Royer-Collard was appointed president of the commission of public instruction (Aug. 15, 1815), which office he held, with the title of councilor of state, till July, 1820. He gave in his resignation at that time, not wishing to associate himself with the politics of the ministry. In 1815 the electors of Marne chose him to represent them in the famous "Chambre Introuvable" (q.v.). He took part in all the business of the chamber, remaining steadfastly attached to the king, but energetically opposing the *ultra* party. In the next parliament he rejected with great energy the idea of confiding public instruction to the clergy. "The university," he exclaimed, "has the monopoly of education, nearly as much as the courts have that of justice, and the army that of the public force."

At the end of the session 1817 Royer-Collard for the first time withdrew from the government, at least from the course pursued by the ministry. He once more supported it in a new discussion against the predominance of the Catholic church; but dating from 1819 the rupture was complete. He presented then the singular spectacle of a devoted royalist seconding the efforts of the liberals. The French academy opened its doors to him in 1827; and in 1828 he was named president of the chamber of representatives. As president Royer-Collard had to present the famous address of the 221 deputies (March, 1830), refusing their support to the government, which the king refused to hear read. Next day the chamber was prorogued. Royer-Collard departed for Châteauvieux, his country-seat, where he went to conceal fears and regrets which the revolution of July was to justify. He was re-elected in June, 1830, and he accepted this mandate. In 1842 he withdrew from parliamentary life, and after that lived in great retirement.

Although Royer Collard had a considerable fortune, he never departed from the greatest simplicity, excepting for three things—the purchase of books, charity, and the receptions which his official position imposed on him. He received with politeness, but with a certain coldness which he could never lay aside. His salon was very much frequented by the political world. Every Sunday the principal leaders of the moderate opposition assembled there: it was a large room, serving as a study, the walls of which were hidden from top to bottom by shelves loaded with books; not a single ornament—no fine furniture—what was strictly necessary, and no more. There assembled Cousin, the most eminent of his pupils; Guizot, the duke de Broglie, Casimir Périer, De Barante, Villemain, Ampère, Andral, De Rémusat, De Barthélemy, Gabriel, and many others. There was little conversation, properly so called; the slow and sonorous voice of Royer-Collard was dominant in the room. The subjects were almost always the political events and the debates in parliament; the acts of the government were not spared. This salon was the echo of the liberal world.

From 1842 Royer-Collard had completely withdrawn from public life, his health, in fact, not allowing him to occupy himself with public matters. He spent only the winter in Paris, returning in summer to his estate of Châteauvieux, where he died Sept. 4, 1845.

Royer-Collard is undoubtedly one of the most noted men of the 19th century. He exercised on his contemporaries a powerful influence, owing more, perhaps, to the uprightness, firmness, and extreme earnestness of his character, than to intellectual power or genius. Excepting his political speeches, published in the *Moniteur*, Royer-Collard left few published works. A lecture on external perception appeared in 1813; some of his minor articles are given in Jouffroy's translation of Reid. See the biographies by Philippe (1857), and Barante (new ed. 1878).

RSHEW, or RJEV, a t. of European Russia, in the government of Tver, and 80 m. s.w. from Tver, on the Volga, which passes through it. It is a place of much commerce, has salt and corn magazines, and two great annual fairs. Pop. '67, 17,528.

RUATAN', or **RATTAN**, an island situated in the bay of Honduras, in the Caribbean sea, in lat. 16° 30′ n., long. 86° 30′ w. It is 30 m. long by 9 broad in its widest part; and its dependencies are Bonacca, Utilla, Helena, Barbarette, and Morat. The whole comprise the colony of the bay islands, and were formerly part of the British dominions, but they were surrendered in 1860 to the republican government of Honduras. The island has a fine climate with a prolific soil. The population, estimated at about 2,000 souls, of whom about 200 are whites, including nearly 100 Spaniards, are principally emigrants from the Caymans.

RUBASSE, a mineral, much prized for ornamental uses, is rock crystal, limpid or slightly amethystine, filled internally with minute brown spangles of specular iron, which reflect a bright red equal to that of the most brilliant ruby. There is an artificial rubasse, made by heating very pure rock crystal red hot, and repeatedly plunging it into a colored liquid.

RUBATO, Tempo (Ital. stolen time), in music, a capricious style of performance in which some notes are prolonged beyond their legitimate time, while others are curtailed, the aggregate value of the bar remaining unaltered. It is a style of performance which is very apt to be abused by inferior players and singers.

RUBBLE, a common kind of masonry, in which the stones are irregular in size and shape. Walls faced with ashlar are generally packed with rubble at the back. Rubble is of various kinds, according to the amount of dressing given to the stones. Common rubble is built with stones left almost as they come from the quarry. Hammer-dressed rubble is so called when the stones are squared with the mason's hammer; coursed rubble, when the stones are squared and equal in height, etc.

RUBEFA'CIENTS are external agents employed in medicine for the purpose of stimulating and consequently reddening the part to which they are applied. All agents which, after a certain period, act as blisters, may be made to act as rubefacients, if their time of action is shortened. The mildest rubefacients are hot poultices, cloths soaked in very hot water, moderately stimulating liniments—as, for example, soap-liniment, with various proportions of liniment of ammonia, or chloroform, etc. Spanish fly, in the form of *emplastrum califaciens,* or warm plaster, in which the active ingredient is blunted by the free admixture of soap-plaster, resin-plaster, etc., is a good form of this class of agents. Capsicum or Cayenne pepper, in the form of a poultice, is an excellent rubefacient; it is much used in the West Indies, but is seldom employed in this country. Mustard, in the form of *cataplasma sinapis,* or mustard poultice, and oil of turpentine, are perhaps the best of the ordinary rubefacients. The former is applied to the soles of the feet and the calves of the legs in the low stage of typhus fever, in apoplexy and coma, in narcotic poisoning, etc. It is also applied to the chest, with much advantage, in many cases of pulmonary and cardiac disease, and to the surface of the abdomen in various affections of the abdominal viscera. The best method of employing turpentine is to sprinkle it freely on three or four folds of clean flannel, wrung out of boiling water. The sprinkled surface of this pad is placed upon the skin, and a warm dry towel is laid over the flannel. Two or three such applications will produce a powerful rubefacient effect. Turpentine thus applied is serviceable in all the cases mentioned in the remarks on mustard, as well as in sore throat, chronic rheumatism, neuralgia, etc.

RUBENS, Peter Paul, one of the greatest of Flemish painters, was b. probably at Siegen, in Westphalia, June 29, 1577. His parents settled in Cologne in 1578, where they remained till 1587, when Rubens's father died, and his mother removed with her family to Antwerp. He was first placed under Verhaagt, a landscape painter; however, inclining more to historical painting, he became a pupil of Van Noort, but soon quitted his school for that of Otho Van Veen, or Venius, who then enjoyed a high reputation; and after studying four years with that painter went to Italy in 1600. Recommended to Vincenzo Gonzago, duke of Mantua, he was sent on a mission by the duke to Philip III. of Spain, and on that occasion painted several portraits of Spanish noblemen. He also spent a considerable time at Venice and Rome making copies for the duke, and executing independent works, which added largely to his reputation. In 1608, after an absence of eight years, Rubens returned to Antwerp on account of the illness of his mother, but she died before he had accomplished the journey. He intended to return to Mantua, but was induced to remain by the archduke Albert, governor of the Netherlands. In 1621 he visited Paris by invitation of Maria de'Medici; and in 1625 completed the series of sketches for the pictures destined to adorn the palace of the Luxembourg. Rubens was sent by the Infanta Isabella, widow of the archduke Albert, on a diplomatic mission to Philip IV. of Spain, in 1628; and in the following year, on a similar mission to Charles I. of England, by whom he was knighted in 1630. Rubens's success as a political diplomatist is worth noting, and seems to indicate a large, solid, and practical nature, such as painters in general do not possess. He died, very rich, in 1640. Rubens is the acknowledged head of the Flemish school. By the expression of powerful and energetic action, and strongly marked character—by great breadth and brilliant coloring he successfully embodied the tendencies of the age in which he lived to pleasures of sense, strong passion, and stirring action; and while admitting the coarseness, and almost grossness of his subjects, especially where the nude figure is introduced, we are in a manner carried away by the spirit of joyousness and an animal vigor conspicuous in his works, and the truthful manner in which he viewed nature. His portraits rank with the highest efforts in that walk of art. He painted animals admirably; and his landscapes possess great brilliancy and natural effect. He was perhaps the greatest master in the mechanical part of the art. His style has had great influence on the English school. The tercentenary of Rubens's birth was celebrated at Antwerp in 1877 with great enthusiasm and with elaborate and splendid festivities.

RUBE'OLA. See Measles.

RUBIA'CEÆ, a natural order of exogenous plants, in which, according to many botanists, the *cinchonaceæ* are included as a suborder; but which, as restricted by others (*stellatæ* of Ray, *galiaceæ* of Lindley), consists entirely of herbaceous plants, with whorled leaves, angular stems, and numerous very small flowers; the calyx superior, with 4, 5, and 6 lobes, or almost wanting; the corolla wheel-shaped, or tubular, regular, inserted into the calyx, and with the same number of divisions as the calyx; the stamens equal in number with the lobes of the corolla; two styles; the fruit a dry pericarp with two cells, and one seed in each cell. There are between 300 and 400 known species, chiefly abounding in the northern parts of the northern hemisphere, and on the mountains of tropical regions. The most important plant of the order is madder (q.v.). To this order belong also bedstraw (q.v.) and woodruff (q.v.).

RU'BICON, a stream of central Italy, falling into the Adriatic, has obtained a proverbial celebrity from the well-known story of its passage by Cæsar, who, by crossing this river—which, at the outbreak of the civil war between him and Pompey, formed the southern boundary of his province—virtually declared war against the republic. Hence the phrase, "to cross the Rubicon," has come to mean, to take an irrevocable step. The modern Luso, called by the peasants on its banks *Il Rubicone*, has claims to being the ancient Rubicon; but arguments preponderate in favor of the *Fiumicino*.

RUBID'IUM (sym. Rb. eq. 85.4) and CÆSIUM (sym. Cs. eq. 133) are two alkaline metals, discovered in 1860–61, by Bunsen and Kirchhoff, by means of spectrum analysis. They resemble potassium more nearly than any other substance, and their names are derived from *rubidus*, dark red, and *cæsius*, sky-colored, in consequence of two red lines of remarkably low refrangibility being present in the spectrum of the former, and two characteristic blue lines in that of the latter. They are widely diffused in nature, but always occur in very small quantities. They have been detected in many mineral waters, and in certain minerals; as, for example, lithia-mica, lepidolite, petolite, and feldspar; and they have been found in the alkaline ashes of the beet-root. The best material for the preparation of rubidium is lepidolite, which will sometimes yield as much as 0.2 per cent of the metal, while the principal source of cæsium is the brine of Dürkheim, in which both these metals were originally found; every ton of the water containing about three grains of chloride of cæsium, and rather less than four grains of chloride of rubidium. It has, however, been recently asserted that the mineral *pollux* contains no less than 34.07 per cent of oxide of cæsium. Both metals are so analogous to potassium, that they cannot be distinguished either from it or from one another by reagents, or before the blow-pipe. Like potassium, they form double salts with bichloride of platinum, which are much more insoluble than the corresponding potassium salt; and it is on this property that the separation of these metals from potassium is based. It is unnecessary to enter into any details regarding the compounds of these metals. It is worthy of remark that rubidium is electro-positive toward potassium, and that cæsium is electro-positive toward rubidium and potassium, and is thus the most electro-positive of the known elements.

The notice of cæsium is included in this article, because its recent discovery prevented it from being considered in its proper alphabetical place in the original edition of this work. For the same reason, we may here briefly notice another metal, INDIUM, discovered by Reich and Richter in the Freiburg arsenical ores. Its most striking property, and that which led to its discovery, is the indigo-blue line which all its compounds (in so far as they have been investigated) show in the spectroscope. Its eq. is 37—new system, 113; its sp. gr. varies from 7.1 to 7.3; its color is between those of tin and silver; it is exceedingly soft and very ductile; and its fusing-point is about that of lead.

RUBINI, GIOVANNI BATTISTA, 1795–1854; b. Italy; made a successful *début* as a singer at Brescia in 1815. He appeared at Paris in 1825, and was soon recognized as the first tenor singer living. His voice ranged from E to F above the staff, and sometimes reached G above the staff. He sang in all the principal European cities, retiring from the stage in 1846. His acting was much inferior to his singing.

RUB'INSTEIN, ANTON, b. Russia, 1829; taken to Moscow at an early age, and studied the piano under Alexis Villoing. He made his first appearance in public when only eight years old, and at the age of ten went with his teacher to Paris, where his performances won for him the encouragement and the advice of Liszt. He then visited England, Sweden, and Germany, and studied composition under Dehn at Berlin. After devoting himself for some time to teaching at Berlin and Vienna he returned to Russia, where he was appointed pianist to the grand-duchess Helena, and subsequently director of the concerts of the Russian musical society. In 1868 he again started on a concert tour, achieving both in Paris and London a brilliant success; and in 1873 came to the United States, where he was enthusiastically received. Among his compositions are the operas *Dimitri Donskoi; Les Chasseurs Sibériens; La Vengeance; Tom le Fou; Les Enfants des Bruyères; Lalla Roukh;* and *Nero;* an oratorio, *Paradise Lost;* and a sacred drama, *The Maccabees.*

RUBLE, ROUBLE, or RUBEL, the unit of the Russian money system. Pieces of peltry formed, in early times, the ordinary medium of exchange in Russia; but about the beginning of the 15th c., silver bars came more and more into use for larger payments, and to make up intermediate sums pieces of the bars were cut off. It was in this cutting off—in Russian, *rubat*—that the name ruble originated. The present silver ruble is equivalent to 3s. 2⅜d. sterling, nearly. Half, quarter, fifth, tenth, and twentieth parts of a ruble are also coined in silver; and gold coins of nominally five rubles (demi-imperials) and three rubles (imperial ducats) are also in circulation. In 1877 the paper ruble had fallen from 6.20, its nominal value, to 10.55 of a pound sterling. The ruble is divided into 100 kopeks.

RU'BRICS (Lat. *rubrica*, from *ruber*, red). in classic use, meant the titles or headings of chapters in certain law-books, and is derived from the red color of the ink in which these titles were written, in order to distinguish them from the text. In mediæval and modern use the name is restricted to the directions which are found in the service-books of the church, as to the ordering of the several prayers, and the performance of the sometimes complicated ceremonial by which they were accompanied. The same name, together with the usage itself, is retained in the church of England prayer-book; and in all these, even where the direction has ceased to be printed in red ink, the name rubric is still retained. Where red ink is not employed the rubric is distinguished from the text by italics, or some other variety of print. In the Catholic church a considerable controversy exists as to whether the rubrics of the missal, the ritual, and the breviary are to be considered preceptive or only directive—a question into which it would be out of place to enter. A similar controversy has existed at various times in the English church. The science of rubrics is with Catholics a special branch of study, the chief authorities on which are Gavanti, Merati, Cavalieri, and other more compendious writers.

RUBRUQUIS, William de, one of the most distinguished of mediæval travelers, was born early in the 13th c.—probably about 1228. He entered, while very young, into the Franciscan order, and being hindered in his favorite scheme of missionary labor in the Holy Land, he was sent by Louis IX. of France into Central Asia for the purpose of forming an alliance with Sartach, the son of Batû Khan of Kiptchak, a supposed Christian sovereign, against the infidels who held the Holy Land. Taking Constantinople as the starting-point, Rubruquis, with two companions, also Franciscans, sailed for Soldaia—now Soujac—near Cherson, made his way across the steppes between the Dnieper and the Don, and crossing the latter river, reached, Aug. 2, 1253, the camp of Sartach, who was now discovered not to be a Christian, and by whom they were sent forward to his father, Batû. When they reached the encampment of Batû on the Volga, near its mouth, that prince refused to treat with them, and sent them forward to the Tartar emperor, Mangû Khan, whom they reached on Dec. 27. At this rude court they remained for several months, and accompanied it about Easter to Kara-korum, where they found a few Europeans. Some time afterward, Rubruquis, being charged with having spoken of the emperor as an infidel, although he defended himself courageously, was compelled to return, but was treated with a certain degree of rude consideration. Proceeding along the banks of the Volga, he penetrated the difficult defiles of the Caucasus, proceeded through Armenia, Persia, and Asia Minor, to Syria, arriving at Tripoli in Aug., 1255, having spent two years and a half in his eastern travel. As king Louis, by whom the mission had been accredited, had meanwhile returned to France, Rubruquis requested permission to follow him, in order to report the result; but fortunately for science the Franciscan provincial refused to permit him to leave the east, and directed him to report in writing. To this fortunate severity we owe the interesting and curious account which he drew up, and of which a lucid summary will be found in Lardner's Cyclopædia, *Inland and Maritime Discovery*, vol. i. p. 261, and following. Of the later history of Rubruquis, the only fact known is that he was still living in 1293, when Marco Polo was returning from the east. His narrative is among the most plain and sober in its tone of all that have come down to us from the adventurous voyagers of the 13th century.

RU'BUS, a genus of plants of the natural order *rosaceæ*, suborder *potentilleæ*, distinguished by a 5-lobed calyx without bracts, and the fruit formed by an aggregation of small drupes adhering to each other upon a long *torus*. The fruit is eatable in all, or almost all, the species, which are very numerous, and natives chiefly of the colder parts of the northern hemisphere, although some are natives of warm climates, and are occasionally to be seen in our hothouses. Some of them are herbs with perennial roots, some are shrubs with subligneous—often only biennial—stems, and they have digitate, pinnate, or lobed leaves. They cause great difficulty to botanists, the varieties being extremely numerous, and the specific distinctions very uncertain. The raspberry (q.v.) and bramble (q.v.) are well-known fruits. The cloudberry (q.v.) also belongs to this genus. Besides these and the species most nearly resembling them and which have been described along with them, notice may be taken of *R. spectabilis*, a shrubby species, with leaves of three leaflets and fine large dark purple fragrant flowers, produced singly on long terminal flower-stalks, a native of the banks of the Columbia river. The fruit is about the size of a raspberry, dark yellow, acid, and somewhat astringent, making excellent tarts.—*R. saxatilis*, sometimes called the *stone bramble*, is a perennial herbaceous plant, with slender stem, leaves of three leaflets, small greenish-yellow flowers, and pleasant fruit of very few rather large drupes. It is a native of stony places, in mountainous parts of Britain.—*R. arcticus* is a small herbaceous plant with creeping roots, slender stems 2 to 6 in. high, each with three or four leaves, which have three leaflets; the flowers large and of deep rose color, and a purplish red fruit of exquisite flavor. This interesting plant is a very doubtful native of the highlands of Scotland, but is very abundant in Norway and Sweden, Siberia, and other arctic countries. In Siberia it is known by a name signifying *prince-berry*. A syrup, a jelly, and a wine are made of it. The fruit is highly esteemed; but although the plant grows very well in our gardens, it seldom bears fruit.

RUBY, a gem much prized, and only inferior in value to the diamond, or perhaps also to the sapphire. It is regarded by mineralogists not as a distinct species, but as a mere red-colored variety of sapphire (q.v.) or of spinel. The *balas ruby* is rose-red. The almandine ruby is tinged with violet or brown. The finest red rubies are generally known as *oriental rubies*, and are indeed brought from the east, chiefly from Ceylon and the Burman empire. The best generally comé from the neighborhood of Syriam, in Pegu. In Ceylon rubies are found in remarkable abundance in alluvial depósits, which have been searched for them for ages, whilst the natives seem never to have thought of digging in the rock of the mountains; but Dr. Gygax found innumerable small rubies in a state of decomposition, falling to powder in a stratum of gray granite with iron pyrites and molybdena; and sir James E. Tennent thinks that mines might be opened with confidence of success. Sir Alexander Burnes describes a ruby mine at Badakshan, in Bactria. Tavernier states that the throne of the great mogul was adorned with 108 rubies, of from 100 to 200 carats each. The king of Arracan is said to have possessed a ruby, in the form of a six-sided prism, about an inch in diameter, terminated by a six-sided pyramid. But the greatest ruby ever heard of was that possessed by the king of Ceylon, which, according to Marco Polo, was a span in length, as thick as a man's arm, and without a flaw. Kublaï Khan sent an ambassador to demand this ruby, offering the value of a city as its price; but the Ceylonese refused to sell it. What has become of it is not known.

RUCKERT, FRIEDRICH, a German lyric poet, was b. May 16, 1789, at Schweinfurt, and died in Jan., 1866. He received his education at the gymnasium of his native town, and studed at Jena university. In 1826 he was nominated professor of oriental languages at Erlangen; went in 1840 to Berlin, as professor and privy-councilor, but resigned that position in 1849, and lived on his estate of Neuses in Coburg. Rückert began his literary career under the pseudonym of Freimund Raimar with his *Deutsche Gedichte* (German Poems, Heidelb. 1814); and *Napoleon, eine Politische Komödie in drei Stücken* (Napoleon, a Political Comedy in three Parts, Stuttg. 1816). Under his own name he published: *Kranz der Zeit* (A Wreath of the Time, Stuttg. 1817); *Oestliche Rosen* (Eastern Roses, Leip. 1822): *Gesammelte Gedichte* (Collected Poems, 6 vols. Erl. 1834–38). As fruits of his oriental studies are to be considered his translations of Hariri's *Makamen*, under the title *Die Verwandelungen des Abu-Seid* (The Transformations of Abu-Seid, 2 vols. Stuttg. 1826); of the Indian tale, *Nal und Demajanti* (Frank. 1828); *Hamasa, oder die Aelteste Arabische Volkslieder* (Hamasa, or the oldest Arabic Ballads, 2 vols. Stuttg. 1846), and *Amrilkais der Dichter und König* (Amrilkais, the Poet and the King, Stuttg. 1847). Original poems of Rückert, also relating to the east, are *Morgenländ. Sagen und Geschichten* (Eastern Tales and Stories, 2 vols. Stuttg. 1837); *Erbauliches und Beschauliches aus dem Morgenländ* (2 vols. Berl. 1837); *Rostem und Suhrab* (Erl. 1838); *Brahmansche Erzählungen* (Brahmanic Tales, Leip. 1839); *Die Weisheit des Brahmanen, ein Lehrgedicht in Bruchstücken* (The Wisdom of the Brahman, a Didactic Poem in Fragments, 6 vols. Leip. 1836–39); *Leben Jesu* (The Life of Jesus, Stuttg. and Tüb. 1839). The titles of his dramas are: *Saul und David* (Erl. 1843); *Herodes der Grosse* (2 vols. Stuttg. 1844); *Kaiser Heinrich IV.* (2 vols. Frank. 1845); *Cristoforo Colombo* (2 vols. Frank. 1845). Rückert was one of the most learned, versatile, and sprightly lyrists of modern times. He tried all sorts of meters, the Greek hendecasyllabic, the old Norse alliterative verse, the old German couplet, the *Nibelungen* strophe, the popular ballad, the delicate yet stately measure of the eastern gazelle (sonnets), and every kind of European quatrains, distiches, etc.; and he succeeded in all. Perhaps his fancy and wit were more remarkable than his depth of lyric feeling, yet the simple pathos of such pieces as the *Aus der Jugendzeit* could hardly be surpassed

RUDD. See RED-EYE.

RUDDER, in a ship or boat, is that part of the steering apparatus which is in immediate contact with the water. It is hung to the stern-post by pintle and brace hinges, and the upper end, passing into the vessel, is acted on by the tiller. So long as the rudder is in a straight line with the keel, the water which glides past the vessel acts equally on both sides, producing equilibrium; but if the rudder be turned, to the right for example, it will be relieved from the pressure on the left side, while that on the right side will act with greater force, and cause the ship to revolve round the center of gravity. When the head has turned sufficiently, the rudder is again put in line with the keel. See HELM.

RUDDER-FISH, *Palinurus perciformis*, a scomberoid fish having the first dorsal fin composed of isolated spines connected by a narrow membrane; gill-covers serrated and spiny; body elevated, compressed, and oblong; tail without lateral keel; teeth small, pointed, and nearly equal; length from 9 to 12 inches; color bluish, white on the sides, with minute black spots; top of head and back marked with black blotches.

RUDDIMAN, THOMAS, the greatest of Scottish grammarians, was b. in Banffshire, at a place called Raggel, in the parish of Boyndie, Oct., 1674. He received the rudiments of his classical education at the parish school, where he already gave promise of his future proficiency. At 16 years of age he went to King's college, Aberdeen, where he took his degree of M.A. four years later. On leaving the university he was engaged as tutor in a private family, in which capacity he remained a year; and thereafter became parish schoolmaster at Laurencekirk. Here he accidentally made the acquaintance of the celebrated physician and Latinist, Dr. Archibald Pitcairne, who was so impressed with Ruddiman's learning and sagacity that he exerted his influence, and succeeded in getting him appointed assistant book-keeper of the Advocates' library, Edinburgh. His new office gave him ample opportunity for prosecuting his favorite studies, but the remuneration was so small that, in 1707, he was compelled to commence business as an auctioneer. It was at this time that he began his career as an editor by publishing an edition of Volusenus's (Florence Wilson's) *Dialogue on the Tranquillity of the Mind*, to which he prefixed a life of the author. In 1709, he published Arthur Johnston's *Poetical Paraphrase of the Song of Solomon*, and the same author's *Cantica*—both in Latin. In 1714 appeared his well-known work—by which his name will always be honorably perpetuated among Scotchmen—*Rudiments of the Latin Tongue*, a text-book from which, under a great variety of forms, his countrymen still continue to be initiated into classical literature. In 1715 he published his great edition of Buchanan's works (2 vols. folio); and in that year, exchanged the calling of an auctioneer for the more congenial one of printer. In this capacity he was assisted by his brother, who became his partner, and had been originally bred to the business. Some years afterward, he was appointed printer to the university of Edinburgh. In 1725 he published the first part of his great grammatical work, his *Grammaticæ Latinæ Institutiones*, which is devoted to the etymology of the language; and in 1732, the second part, which treats of the syntax. His philological reputation rests mainly on this work, which has been re-edited in Germany by Stallbaum, and is repeatedly referred to in the Latin lexicon of Freund. He also prepared an elaborate treatise on prosody, of which, however, he published only an abridgment. His next appointment was that of principal keeper of the Advocates' library. In this capacity he published a magnificent edition of Anderson's *Diplomata et Numismata Scotiæ* (1 vol. folio), and prefixed a learned introduction in Latin. Controversy with men such as Benson, who contrasted the Latin verse of Johnston unfavorably with that of Buchanan, and with Logan on the hereditary right of the kings of Scotland to the crown, consumed a great part of his time, but did not so preoccupy his thoughts as to prevent him from publishing, in 1751, an edition of Livy in 4 vols. 12mo, a gem of typography, and still known as the "immaculate" edition, from its entire exemption from errors of the press. Ruddiman died in Edinburgh, Jan. 19, 1757, in his 83d year. In politics he was, like his friend Pitcairne, an ardent tory and Jacobite; and in private life, a most upright and estimable man. Besides the publications already noted, he edited the translation of Virgil's *Æneid* by bishop Gawain Douglas, and appended a very valuable glossary (folio, 1710). He also founded the *Caledonian Mercury* newspaper, and published or edited a multitude of minor tracts and books. His life has been written by George Chalmers, the antiquary (1 vol. 8vo. 1794)

RU'DENTURE, the molding, in form like a rope or staff, filling the flutings of columns, usually one-third of the height. It is sometimes plain and sometimes ornamental.

RÜ'DESHEIM, a small t. of Prussia, in Hessen-Nassau, on the right bank of the Rhine, opposite Bingen, and 16 m. w. of Mainz. In the vicinity is grown one of the most aromatic and fiery of the Rhine-wines (q.v.) called the *Rüdesheimer;* about 650 casks are produced yearly. Pop. 2,500.

RUDOLF, or RODOLF, of Hapsburg, the founder of the imperial dynasty of Austria, which for a time was that of Germany, was b. in 1218, and was the son of Albert, count of Hapsburg and Hedwig of Kyburg-Zäringen. Rudolf early exhibited great personal daring and military skill, and acquired celebrity in his native canton of Aargau for the prowess and ability with which he repulsed many bands of banditti who infested the district. The death, in 1264, of his uncle, Hartmann of Kyburg, to whose rich heritage he succeeded, raised him from the condition of a poor noble to the rank of an influential lord of extended territories, which included the greater part of Aargau, and various domains in the cantons of Bern, Lucerne, Zug, and Zürich. The able manner in which he governed these dominions, and exercised the functions of protector of the Waldstätter or forest cantons, attracted the notice of some of the great electoral princes of Germany; and on the death of the emperor Albert in 1273, Rudolf was elected his successor, chiefly through the instrumentality of his powerful friend, the archbishop of Mainz. The ratification by pope Gregory XI. of Rudolf's title was obtained at the cost of various concessions, as, for instance, the renunciation of all jurisdiction in Rome, and of all feudal superiority over Spoleto and the marches of Ancona; together with the cession of all right on the part of the emperor and his successors to interfere in ecclesiastical elections, or in the internal administration and management of the German church. By this agreement the feuds were appeased which had existed for nearly 200 years between the empire and the see of Rome, and Rudolf was able to turn his attention to the settlement of the internal disturbances of

Germany. His chief enemy was Ottocar, king of Bohemia, under whom he had once served against the Prussians and Hungarians, and who now refused to do homage to him. Fortune, however, favored Rudolf in the war with the Bohemian king, who, after a first defeat, again rose in arms against the empire, but was ultimately defeated and killed in battle (1278), when the emperor seized all the Austrian territories which Ottocar had possessed. Wenceslaus, the son of the slain king, having lost no time in tendering homage for the kingdoms of Bohemia and Moravia, the cause of the war was at an end, and peace being restored, Rudolf thenceforth devoted himself to the organization of the state. His great merit was in breaking the arbitrary power of the nobles, by compelling them to demolish the fortresses and strongholds, by means of which they carried on plundering expeditions against one another, and defended themselves from the power of the law; and we are told that in one year he condemned to death 30 refractory nobles, who had long disturbed the public peace, and razed to the ground double that number of strongholds. He also granted charters to many trading towns and municipalities, and thus gave considerable impetus to trade. The policy of his rule generally was indeed so greatly to favor the burgher and working classes, and to repress the tyranny of the powerful nobles, that his reign presented in this respect a favorable contrast to those of his predecessors, and the respect in which he was held by all ranks bears the strongest testimony to his admirable qualities as a ruler. Rudolf died in 1291, and was succeeded in Austria by his son, Albert I., duke of Austria. See Schônhuth's *Geschichte Rudolf's von Habsburg* (2 vols., Leips. 1843–44.

RUDOLF or Rodolf II., eldest son of the emperor Maximilian II. of Germany, was b. in 1552 and educated at the Spanish court by the Jesuits. On the death of his father in 1576 he succeeded to the imperial crown, after having, during the lifetime of his father, been proclaimed king of the Romans. This first reigning namesake of the great progenitor of the Austrian dynasty did not add to the dignity or greatness of the Hapsburg family; and the whole of his reign of 36 years was marked by persecutions and intolerance on his side, and by discontent and even insurrection on that of his subjects. His bigotry and intolerance in forbidding Protestants the free exercise of their religion, led them to ally themselves with their co-religionists in the Low Lands and in France (1608), and by implicating the empire in foreign wars, augmented taxation, and increased the monetary difficulties of the state. Rudolf, who was gloomy, taciturn, and bigoted, had not the qualities necessary to secure the good-will of those around him, and he died, unregretted by his subjects, Jan. 20, 1612, leaving no issue, and bequeathing to his brother Matthias, who succeeded him, an impoverished and distracted state. Rudolf's taste for astrology and the occult sciences, and his anxious desire to discover the philosopher's stone, led him to extend his patronage to Kepler and Tycho Brahé, whose study of astronomy was thought specially to qualify them for that much-coveted discovery; and the patronage which Rudolf extended to the Danish discoverer, when the latter was compelled to leave his own country, through the jealousy of his brother-nobles, has proved one of the few claims possessed by Rudolf to the grateful remembrance of late times. The important astronomical calculations begun by Tycho, and continued by Kepler, which are known as *The Rudolphine Tables*, derive their name from this emperor, who originally undertook, but subsequently failed, for want of means, to defray the expenses incidental to the undertaking. See Kurz's *Geschichte Oestreichs unter Kaiser Rudolf* (Linz. 1821).

RU'DOLSTADT, the chief t. of the principality of Schwarzburg-Rudolstadt, is charmingly situated in a hill-girt valley, on the left bank of the Saale, 18 m. s. of Weimar. Pop. '75, 7,638.

RUDRA is, in Vedic mythology, a collective name of the gods of the tempest, or Maruts, Rudra (in the singular) being the name of their father. (See John Muir's *Contributions to a Knowledge of the Vedic Theogony and Mythology*, in the *Journal of the Royal Asiatic Society*, new series, vol. i. part 4, London, 1864). In later and Puranic mythology (see Hindu Religion and Purâna), Rudra (the terrible) is a name of S'iva, and the Rudras are his offspring. "From Brahmâ's forehead," the *Vishn'u-Purân'a* relates, "darkened with angry frowns, sprang Rudra, radiant as the noontide sun, fierce, and of vast bulk, and of a figure which was half male, half female. "Separate yourself," Brahmâ said to him, and having so spoken, disappeared: obedient to which command, Rudra became twofold, disjoining his male and female natures. This male being he again divided into eleven persons, of whom some were agreeable, some hideous, some fierce, some mild; and he multiplied his female nature manifold, of complexions black or white." See Wilson's *Vishn'u-Purân'a*.—The word *rudra* apparently comes from the Sanskrit *rud*, weep; but as the sense of this radical does not yield any satisfactory clue to the meaning of the deity called Rudra, the *Purân'as* invented a legend, according to which Rudra received this name from Brahmâ, because, when a youth, he *ran about crying aloud;* and when asked by Brahmâ why he wept, replied that he wanted a name. "Rudra be thy name," rejoined Brahmâ: "be composed; desist from tears." In this legendary etymology there is, moreover, a punning on the similarity between *rud*, cry, and *dru*, run—an illustration of one of the sources whence the later mythology of India derived some of its boundless stock of absurd myths.

RUE, *Ruta*, a genus of plants, of the natural order *rutaceæ*, having a short 4 to 5 parted calyx, 4 or 5 concave petals, affixed by a claw, 8 or 10 stamens, and a 4 to 5 lobed germen, with 8 or 10 nectariferous pores at the base. The species are natives of the s. of Europe, the n. of Africa, the Canary isles, and the temperate parts of Asia. They are half shrubby; and have alternate, stalked, repeatedly pinnate leaves with translucent dots, the flowers small, and in terminal corymbs. COMMON RUE, or GARDEN RUE (*R. graveolens*), grows in sunny stony places in the countries near the Mediterranean. It has greenish-yellow flowers, and glaucous evergreen leaves with small oblong leaflets, the terminal leaflets obovate. It is not a native of Britain, but is frequently cultivated in gardens. It was formerly called *herb of grace* (see *Hamlet*, act iv. scene 5), because it was used for sprinkling the people with holy water. It was in great repute among the ancients, having been hung about the neck as an amulet against witchcraft in the time of Aristotle. It is the *pēganon* of Hippocrates. Rue is still employed in medicine as a powerful stimulant, but the leaves must be used fresh, as they lose their virtues by drying. The smell of rue when fresh is very strong, and to many very disagreeable; yet the Romans used it much for flavoring food, and it is still so used in some parts of Europe. The leaves chopped small are also eaten with bread and butter as a stomachic, but they must be used sparingly, as they are acrid enough to blister the skin if much handled, and in large doses act as a narcotic poison. All their properties depend on an acrid volatile oil, which is itself used for making *syrup of rue*, 8 or 10 drops of oil to a pint of syrup; and this, in doses of a teaspoonful or two, is found a useful medicine in flatulent colic of children. The expressed juice of rue, mixed with water, and employed as a wash, promotes the growth of the hair. Some of the species found in the n. of India resemble common rue in their properties, and are used for the same purposes.

RUELLIA, a genus of plants of the natural order *acanthaceæ*, natives of tropical and subtropical parts of Asia and Australia. Some of them are very beautiful, and are common ornaments of our hot-houses. In some parts of China, especially in the province of Che-kiang, and on the mountains to the w. of Ning-po, a species of this genus, *R. indigofera*, is much cultivated for the excellent indigo which it yields. It is also a native of Assam, and is cultivated there. See Fortune's *Residence among the Chinese*.

RUFF, *Machētes pugnax*, the only known species of its genus, is a bird of the family *scholopacidæ*, and like snipes and many others of the family, an inhabitant of marshy places. It is found in most of the northern parts of the world, migrating southward in autumn, and northward in spring. It is found in England and in Ireland, but not in Scotland, probably because there are few localities in that country suitable to it. In size the ruff is considerably larger than a snipe, and is about a foot in entire length, from the point of the bill to the tip of the tail. The tail is short and pointed. The wings are long and pointed. The legs are long and slender, the *tibia* naked for some distance above the tarsal joint. The bill is straight, rather slender, as long as the head. The neck of the male is surrounded in the breeding season with a *ruff* of numerous long feathers, whence probably the English name. The males are remarkable for diversity of colors, no two specimens being ever similar; but ash-brown prevails, spotted or mottled with black; the head, ruff, and shoulders are black, glossed with purple, and variously barred with chestnut. The female (the *reeve*) is mostly ash-brown, with spots of dark-brown, much more uniform in color than the male. Their nest is usually situated on a tussock in a moist, swampy place, and is formed of the coarse grass which surrounds it. The eggs are four in number. The ruff is taken for the table in spring, but the young birds taken in autumn are very preferable. They are often fattened after being taken, and are fed on bread and milk with bruised hemp-seed. After being fattened, they are sent to market. They feed readily when quite newly caught, and fight desperately for their food, unless supplied in separate dishes, which is therefore the regular practice of the feeders, who find it also advantageous to keep them in darkened apartments. The ruff is gradually becoming scarcer in England, owing to the destruction of its favorite haunts, the fens, by drainage.

RUFFE, or POPE, *Acerina cernua*, a very pretty little fish of the perch family (*percidæ*), abundant in the lakes, slow rivers and ditches of many parts of the middle of Europe and of England. It is not found in Scotland. It is never more than 5 or 6 in. long. In shape it resembles the common perch, but has only a single dorsal fin. The ruffe is highly esteemed for the table. It is very easily caught, a small red worm being used as bait.

RUFFED GROUSE. See BONASIA, *ante*.

RUFFIN, EDMUND, 1794–1865; b. Va.; editor of the *Farmer's Register* 1833–42, and for several years president of the Virginia agricultural society. He also edited other agricultural papers, and wrote treatises on scientific agriculture. He fired the first gun of the rebellion at fort Sumter Apr. 14, 1861; and committed suicide, it is said, from his aversion to living under the U. S. government.

RUFFI'NI, GIOVANNI, b. Italy, 1810; educated at Genoa, where he met Mazzini, whom he afterward joined in the so-called "Young Italy" organization at Marseilles. His brother Jacopo was put to death after the unsuccessful invasion of Savoy in 1834.

Giovanni escaped to England, where, with the exception of a short time in 1848, when he was Sardinian minister at Paris, he has since resided. He writes the English language remarkably well, and has published *Doctor Antonio*, 1855; *Lavinia*, 1860; and other works.

RUFFLE is a low vibrating sound, less loud than a roll, produced by drummers. It is used as a compliment to general officers and at military funerals.

RUGBY, a market t. of England, in the co. of Warwick, and 15 m. n.e. of the town of that name, is pleasantly situated on a rising ground on the left bank of the Avon, and is reached by five different railways. It derives its importance and celebrity wholly from its grammar-school, founded by Lawrence Sheriff, a London shopkeeper, in 1567. The buildings of the school, consisting of a fine Elizabethan quadrangle, with cloisters, and an elegant detached chapel, are of brick, with stone-work round the windows and at the angles and cornices. The chapel contains, among other monuments of head-masters, that of the late Dr. Arnold. The school is generally attended by about 500 pupils. The endowment of the school produces about £5,000 a year, and it offers 20 exhibitions of values varying from £40 to £80 a year, and tenable for four years. A park of 11 acres is set aside for football, cricket, and other games. The railways and the school give rise to almost all the trade of the town. Pop. '71, 7,385.

RUGBY, a colony in Tennessee, founded by a company of New England capitalists, but transferred to an English organization with a capital of £150,000, and placed under the general superintendence of Mr. Thomas Hughes, author of *Tom Brown's School Days at Rugby*. The company purchased 50,000 acres on the Cumberland plateau in Tennessee with the refusal of 350,000 more acres. The land purchased was colonized in 1880, mainly by English farmers, and was laid out in building sites, farms, parks, etc. It is situated in Morgan, Scott, Overton, and Fentress counties, and is rich in timber, minerals, water, and fertile soil. A town was laid out, a hotel built, and a road 7 m. long put under construction to connect with the Cincinnati Southern railroad. A saw-mill and brick-kiln were erected, roads and bridle-paths made, and a cricket-ground and English garden added as features of attraction. The new plan of colonization adopted was calculated to establish a permanent settlement of sons of English farmers of the better class, in fair circumstances, and with a certain degree of culture; while it also was intended to draw a considerable American representation. Its beginning has been under excellent auspices, and promises success.

RU'GE, ARNOLD, b. 1802; studied in the universities of Heidelberg, Halle, and Jena. He became a member of a secret political society among the students, and for this offense was imprisoned for six years. Being released in 1830 he became a professor in the university of Halle. He had already translated the *Œdipus in Kolonos* of Sophocles, and had done something in dramatic composition, and in 1838 joined with Echtermeyer in founding the *Annales de Halle*, opposed to church and state. He emigrated to Switzerland, *via* France, and published his *Zwei Jahre in Paris* in 1845. In 1847 he established a book-seller's business in Leipsic; and after the revolution of 1848 published a radical journal called the *Réforme*. He was elected to the Frankfort assembly, and sat in the radical congress at Berlin. Being concerned in insurrectionary movements, he was compelled to flee to England in 1850, and after that date resided at Brighton, contributing to German literature.

RU'GELEY, a market t. in the county of Stafford, on the right bank of the Trent. There are iron-works in the town, and collieries in the vicinity. Pop. '61, 4,362; '71, 8,375.

RÜGEN, the largest of the islands of Germany, belongs to Prussia, and lies in the Baltic, off the coast of Pomerania. Greatest length, 33 m.; greatest breadth, 28 m.; area, 360 sq. miles. Pop. 45,699. It is separated from the main-land, with which at one time it was probably connected, by a strait, about a mile in width. The island is so deeply indented on all sides by the sea, that it seems to be formed of several narrow tongues of land attached to each other, and to which the name of peninsulas has been given. On the peninsula of Jasmund is the precipitous cliff called the Stubbenkammer, the highest point of which (420 ft.) is called the king's seat, because Charles XII. witnessed from this spot a sea-fight between the Swedes and Danes, Aug. 8, 1715. Rügen, which until 1815 had remained Swedish territory, was in that year transferred to Prussia. Hertha lake, in this island, is believed to be the place where, according to Tacitus, the goddess Hertha (Earth) was worshiped. The soil of the island is productive, cattle are reared, and the fisheries around the island are carried on with profit. The scenery of Rügen, which is everywhere pleasing, and is frequently grotesque and romantic, together with the facilities for sea-bathing, attract numerous visitors. Chief town, Bergen, in the middle of the island, with (1875) 3,591 inhabitants.

RUGER, THOMAS H., b. N. Y., 1833; graduated at West Point. He practiced law in Wisconsin 1856–61, when he entered the army. He was made brig.gen. in 1863, brevetted maj.gen. for his conduct at the battle of Franklin, and commanded the department of North Carolina till 1866, when he was appointed col. in the U. S. infantry. He was superintendent of West Point 1871–76.

RUGGLES, SAMUEL BULKLEY, LL.D., b. Conn., 1800; graduated at Yale college in 1814, and studied law, being admitted to practice at the New York bar in 1821. In 1838 he was elected a member of the state legislature, and the following year was made a canal commissioner, being president of the canal board in 1840, and again in 1858. In 1867 he was a U. S. commissioner to the Paris exposition, and represented the United States in the international monetary conference in that city. He was also a representative to the statistical conference at the Hague in 1869, and has since acted in a similiar capacity at various international meetings of the same character. An active and industrious member of the N. Y. chamber of commerce, Mr. Ruggles has devoted himself with great assiduity and established accuracy to the collection of valuable statistics concerning productions, transportation, etc.

RUGGLES, TIMOTHY, 1711-95; b. Mass.; graduated at Harvard 1732; studied law and practiced at Sandwich and Hardwick. In 1755 he was second in command at the battle of lake George. He held successively the positions of judge of the common pleas court, chief-justice of the state, and speaker of the assembly; and in 1765 was a delegate to the New York stamp act congress, refused to concur in its resolutions, and, as a royalist, took refuge in Nova Scotia, where he founded the town of Digby.

RUHNKEN, DAVID, b. Jan. 2, 1723, at Stolpe, in Pomerania; received his academical education first at the Königsberg gymnasium, where he distinguished himself not only in classical learning, but even in music and drawing, and afterward at Wittenberg university, where he spent two years in the assiduous study of ancient literature, history, and jurisprudence. He graduated 1743; after which he went to Leyden, where for six years he prosecuted his classical studies under the guidance of Hemsterhuis, and bestowed particular attention on the Greek writers, nearly all of whom he read. He devised a new edition of Plato, collected the scholia of that author, and published an excellent edition of Timæus's *Lexicon Vocum Platonicarum* (Leyd. 1754; re-edited in a much improved form, 1789). He went in 1755 to Paris, where, for a whole year, he examined the MSS. of the royal library and of the library of St. Germain. Hemsterhuis then got him appointed as lector (reader) in the university of Leyden, in which capacity he was the assistant and colleague of his great master. In Oct., 1757, he introduced his series of lectures by a discourse, *De Græcia Artium et Doctrinarum Inventrice* (Leyd. 1757). For four years he discharged the duties of his office with a skill and success that raised him in public esteem, as one of the most learned men in Holland. In 1761 he succeeded Oudendorp in the chair of eloquence and history. In 1767 he lost his friend and master Hemsterhuis; and in his capacity as rector of the university, delivered a splendid tribute to the deceased in his *Elogium Tiberii Hemsterhusii* (Leyd. 1768). In 1774 he succeeded Gronovius as librarian to the university, which he enriched with a multitude of valuable books and MSS. He died May 14, 1798, and in gratitude to his memory, the city of Leyden purchased his great library, and gave his widow an annuity of 500 florins.

Ruhnken will long be remembered as one of the best scholars and critics of the 18th century. His fine taste and sagacity, aided by an astonishing memory and vast learning enabled him to illustrate the authors of antiquity with wonderful success. He was also a brilliant prelector, for which he was no doubt indebted to the extreme lucidity and grace of his Latin style. A list of his works would occupy much space. In addition to those already noted, we may mention his edition of vol. ii. of Alberti's Hesychius; his edition of Rutilius Lupus; of Velleius Paterculus; of Muretus, etc. He contributed to the editions of the classics by other scholars, such as Ernesti and Schweighäuser, and thereby accumulated a vast amount of valuable material in the shape of correspondence and miscellanea. His life has been written by his famous pupil Wyttenbach (Leyd. 1799; new and improved edition, Leips. 1822, and Freiberg, 1846).

RUHR, a river of Prussia, an affluent of the Rhine, rises about a mile from Winterberg, in the e. of Westphalia, and flowing in a w.n.w. direction, enters the plain of the Rhine at Mühlheim, and joins the great river at Ruhrort, 2 m. n.w. of Duisburg. Entire length 143 miles.

RUHRORT, a small t. of Rhenish Prussia, on the right bank of the Rhine, 63 m. n.e. of Aix-la-Chapelle by railway. It has the best harbor on the lower Rhine, possesses many large ship-building docks, is the seat of an immense coal-trade with Holland—the coal being derived from large beds of the mineral on the banks of the Ruhr—and carries on a large carrying-trade in corn, timber, and wool, and in miscellaneous articles. A large fleet of steamers, with passengers and traffic, ply from Ruhrort up to Strasburg, and down to Holland. A railway crosses the Rhine here, and passengers and goods are carried across the river in the carriages, and without being put to the trouble of shifting their seats, by means of a large steamer, the deck of which is fitted with rails. On each side of the river is a tower, 120 ft. high, connected with the railway, and furnished with a powerful engine, by means of which the railway carriages are lowered to the water on one side, and lifted to the railway on the other. Pop. '75, 9,053.

"**RULE BRITANNIA,**" one of the national anthems of Great Britain, which has been described by Southey as "the political hymn of this country as long as she maintains her political power." Its original appearance was in a mask entitled *Alfred,* the words by

James Thomson the poet, and David Mallet, and the music by Dr. Arne, which was performed for the first time on Aug. 1, 1740, before Frederick prince of Wales, at his residence at Cliefden. The words of the ode are believed to be the composition of Mallet. *Alfred* was altered by Mallet in 1751, when three stanzas of *Rule Britannia* were omitted, and three others, by lord Bolingbroke, substituted for them; but it is the ode in its original form that has taken root.

RULE NISI, in the English and Irish courts of law, is a technical term denoting the first step in an interlocutory application to the court, such as an application for a new trial. The usual course is for the party who takes the initiative to move, *ex parte*, for a rule nisi, i.e., an order of the court that something shall be done, *unless* the opposite party, within a certain time, usually three or six days, show cause, i.e., some good reason why the thing proposed should not be done. When the party obtains a rule nisi, he sends a copy of it to the other party, who must then, at the time appointed, show cause, and if the cause is deemed sufficient, the rule is discharged, i.e., the application is refused; if the cause is insufficient, the rule is made absolute, i.e., the opposite party is bound to do the thing asked, otherwise he will be liable to some disadvantage or to imprisonment, according to the nature of the subject matter.

RULE OF FAITH, the name given in polemical theology to what is regarded as the code from which the faith of Christians is to be drawn. One of the most vital of modern religious controversies is that which turns upon the question: What is the Christian rule of faith? We can but undertake to state the conflicting views. The reformers, as a body, laid it down as a first principle, that the word of God alone, by which they meant the written word, or the Scriptures, could safely be accepted as a rule of faith. If the fathers could be received at all, it is only in the light of witnesses, and fallible witnesses, to the ancient interpretation of the Scriptures. This doctrine appears to be much modified in the English church of the Laudian period, and by the successors of that school, the modern Tractarians, who admit the "consent" of the fathers as an authoritative interpretation of the Scriptures. Roman Catholics, on the contrary, while they admit that God's word alone is the rule of faith, yet contend that the Scriptures are not to be considered as the only depository of God's word. Much of our Lord's teaching to his apostles was not committed to writing in these authentic Scriptures; and as the teaching of Christ, wherever found, is God's word, even as much as what is written in the Scriptures, they hold that if it be possible to find such teaching elsewhere than in the Bible, the teaching so found is to be held as part of the rule of faith. Now they hold that the traditions of the church, contained in the writings of the fathers, the decrees of councils, the decretals of popes, are a depository of Christ's teaching, less accessible, it is true, but when unanimous, not less certain than the Scripture itself; and of this certainty of such unanimous interpretation, they regard the church as at all times the authoritative expositor.

Protestants acknowledge the authority of the oral teaching of Christ himself, and of his apostles, or others speaking by inspiration; but in respect of the want of any authoritative or trustworthy record, they deny that any such teaching, not recorded in the Scriptures, is of any value to us. As to the right of the church to expound authoritatively, they deny it altogether

RULE OF THE ROAD. This phrase includes the regulations to be observed in the movements of conveyances either on land or at sea.—*On land:* drivers and riders keep the side of the road next their left hand when meeting, and that next their right when overtaking and passing other horses or conveyances. The person neglecting this rule is liable for any damage that may happen through such neglect. A man riding against a horse or a conveyance driving against another that is standing still, is answerable for any damage that may ensue.—*At sea:* vessels meeting from opposite directions *port their helms* and pass one another on their left sides. A vessel overtaking another shall keep clear of that overtaken. When two sailing-vessels are crossing one another, the one that has the wind on its *port* (left) side has to keep clear of that which has the wind on the *starboard* (right) side, except when the former is *close-hauled*, and the latter free. If they have the wind on the same side, the ship that is to windward must keep clear of that to leeward. A steamer having another on her starboard side has to keep out of its way. Steamers have to keep out of the way of sailing-ships, and to slacken speed when nearing other vessels. When one vessel has to get out of the way, the other keeps her course; but safety being the first consideration, these rules are not to be acted upon at all hazards, when their observance incurs obvious risk of danger. For further details and the rules regarding ship's lights, see McCulloch's *Dictionary of Commerce*, art. "Collision."

RULE OF THE ROAD (*ante*), in the United States, is precisely the opposite of that in England, in that two vehicles meeting turn to the right instead of to the left, and it has been held that this rule does not apply to equestrians or foot-travelers. Moreover, it is conceded that circumstances may justify drivers in violating the rule, the controlling principle being that due care and diligence must be used under the special circumstances of each case. In regard to the course to be pursued at sea and as to lights and fog-signals, see NAVIGATION, LAWS AS TO (*ante*)

RULE OF THREE is the technical term for that rule in arithmetic, otherwise called proportion (q.v.), which teaches the finding of a fourth number proportional to *three given numbers*. The term "rule of three" has been in use from the commencement of the 16th c.; and from the great utility of the operation in commercial transactions, it received, almost from the commencement, the name of the Golden Rule (q.v.). To the ordinary "rule of three" was added the *backer rule*, or "rule of three inverse" (corresponding to inverse or reciprocal [q.v.] proportion), and the "double rule of three," in which two or more ratios are given as determining the number to be found.

RUM, a mountainous island of Argyleshire, belongs to the group of the Inner Hebrides, 15 m. n.n.w. of Ardnamurchan Point. It is 8 m. long, about 7½ m. broad; area upwards of 30,000 acres, only about 6 per cent of which is under cultivation. Pop. '51, 162; '71, 81. The island is a mass of high sharp-peaked mountains, rising in Ben More to the height of 2,320 feet.

RUM, a kind of spirit made by fermenting and distilling the "sweets" that accrue in making sugar from cane-juice. The scummings from the sugar-pans give the best rum that any particular plantation can produce; scummings and molasses, the next quality; and molasses the lowest. Before fermentation water is added, till the "set" or wort is of the strength of about 12 per cent of sugar; and every ten gallons yields one gallon of rum, or rather more. The flavor of rum depends mainly on soil and climate, and is not good where canes grow rankly. Pine apples and guavas are at times thrown into the still, but on the great scale, no attempt is made to influence flavor artificially. The finest-flavored rums are produced by the old-fashioned small stills. The modern stills, which produce a strong spirit at one operation, are unfavorable to flavor. The color of rum is imparted after distillation by adding a certain proportion (varying with the varying taste of the market) of caramel, or sugar melted without water, and thus slightly charred. Rum is greatly improved by age, and old rum is often very highly prized; at a sale in Carlisle in 1865, rum known to be 140 years old sold for three guineas per bottle. It forms a very important part of our colonial produce: the quantity imported into Britain in 1875 was 8,815,681 gallons (home consumption, 5,361,486), valued at £1,014,456. Rum is distilled both in the East and West Indies.

RU'MA, a small t. of Austria, in Slavonia, on an affluent of the Save, 35 m. n.w. of Belgrade. The chief industry is wine-culture, and the rearing of horses. Pop. '69, 7,771.

RUMA'NIA. See ROMANIA and MOLDAVIA.

RUMFORD, BENJAMIN THOMPSON, Count, an American inventor, was b. at Woburn, Mass., Mar. 26, 1753. Having received the rudiments of education at a common school, he entered a merchant's office at Salem, at the age of 13, and got his living as a clerk and school teacher, while he studied medicine and physics. In 1770 he was engaged as teacher of an academy at Rumford, now Concord, the capital of New Hampshire; and in 1772 married a rich widow of that place, and was made maj. of militia by the English governor. The jealousy of officers over whom he had been promoted, and charges of disaffection to the royal cause, at this period of the outbreak of the American revolution, drove him from Rumford to Boston, where he became acquainted with gen. Howe; and when gen. Washington compelled the surrender of Boston, Thompson was sent to England as bearer of dispatches. In London he so won the favor of the government by his intelligence as to be appointed under-secretary of state in the colonial office. On a change of ministry, however, he returned to America, and fought in the royal cause. When it failed, he entered the service of the king of Bavaria, by whom he was knighted; and in 1784 he was settled at Munich as aid-de-camp and chamberlain to the reigning sovereign. In this post he exhibited the energy of his mind and the fertility of his invention. He reorganized the army and improved its tactics. In 1790 he suppressed beggary throughout the kingdom, took measures for improving the breeds of horses and cattle, and laid out a park for Munich. He rapidly rose to the offices of maj.gen., councilor of state, lieut.gen., minister of war, and was created count of the holy Roman empire, when he chose Rumford, where his fortunes had begun, as his titular designation. In 1795 he visited London, where he was treated with much attention, and finding that his opinion was sought after on technological subjects, he published the results of his experience and the records of his labors in Bavaria. Having long and carefully studied the phenomena of heat, he set himself to devise a remedy for the smoky chimneys, which were one of the greatest nuisances at that time in England; and discovered the principles upon which fireplaces and chimneys have since been constructed. Other cases in which greater economy of the application or production of heat could be obtained, as cooking-ranges, stoves, etc., engaged much of his attention. On his return to Bavaria he was appointed president of the council of regency, and soon after, minister plenipotentiary to the court of St. James; but the British government, holding to the doctrine of inalienable allegiance, refused to recognize him in that capacity. He declined an invitation to revisit America, where he was greatly admired, in spite of his loyalty. He finally settled in Paris; devoted himself to improvements in artillery and illumination; founded a professorship in Harvard college, of the application of science to the arts of living; married the widow of Lavoisier; and died at Auteuil, near Paris, Aug. 21, 1814, after making many important bequests to the royal society of

London, the American academy of sciences, and Harvard university. See *Memoir* by Ellis (1876).

RU'MILI. See ROUMELIA.

RUMINANTIA, in the zoological system of Cuvier, and of almost all recent naturalists, the name given to an order of mammalia called *pecora* by Linnæus, an extremely well-defined natural order, among the individuals of which the habit of *rumination* or chewing the cud is universal and almost peculiar. The ruminantia are all strictly and exclusively herbivorous, and exhibit a great similarity of structure. They have no incisors in the upper jaw, the front of which is occupied by a callous pad. "The grass is collected and rolled together by means of the long and movable tongue; it is firmly held between the lower cutting teeth and the pad, the cartilaginous upper lip assisting in this; and then, by a sudden nodding motion of the head, the little roll of herbage is either torn or cut off, or partly both torn or cut."—Youatt. In the lower jaw there generally appear to be eight incisors; but the two outer are more properly to be regarded as canines, and in the *camelidæ* they assume the ordinary canine form. Some of the ruminantia have canine teeth in the upper jaw, and some are destitute of them. In front of the molar teeth there is a long vacant space in both jaws. The molars are six on each side in each jaw; their surface exhibits crescent-shaped ridges of enamel. The head is elongated, the neck is always of considerable length, the eyes are placed at the side of the head, and the senses of smell and hearing, as well as of sight, are extremely acute. The head is in many ruminantia armed with horns, which in some are found in both sexes, in some only in the male, whilst in others they are wholly wanting; and the absence of them characterizes varieties of some species, as the sheep and ox, in which they are ordinarily present. The horns differ very much in different families, even in their structure, some being hollow (true *horns*), some solid (*antlers*). All the four limbs are terminated by two large toes, which are hoofed. Behind the hoof are always two small spurs, rudimentary toes. The metacarpal and the metatarsal bones are united into one, called the *cannon* bone. The legs are rather long, and the spinal column is very flexible. The brain of the ruminantia is small, and they do not exhibit much intelligence; nor are they distinguished by any remarkable instincts; and though easily tamed, they are scarcely susceptible of any kind of training or education. Very few, however, of the numerous species of ruminantia have been truly domesticated, and probably much is yet to be done in this way.

The ruminantia are generally gregarious; they are distributed over almost the whole world; but none are natives of Australia. They are found both in the warmest and the coldest regions. The flesh of all the ruminantia is fit to be used for human food; the fat (tallow) hardens more on cooling than the fat of other animals, and even becomes brittle. The fat, hide, horns, hoofs, hair, bones, entrails, blood, and almost all parts are useful to man.

The intestines are long in all the ruminantia. The cæcum is also long. The complex stomach, adapted to rumination, requires a more particular description. The stomach consists of four distinct bags or cavities. The first of these, into which the gullet or esophagus enters, is, in the mature animal, by far the largest, and is called the *paunch* (Lat. *rumen*). Into this the chief part of the food passes. It is lined with a thick membrane, presenting numerous prominent hard papillæ, secreting a fluid in which the food is soaked. The second cavity is the *honey-comb bag* (Lat. *reticulum*), so called from its being internally covered with a net-work of cells, like those of a honey-comb. In Scotland it is known as the *king's hood*. This second cavity, or stomach, has also a direct communication with the esophagus, and fluids seem in general to pass immediately into it, but sometimes or partly also into the other cavities; and it is here that the cells for retaining water are chiefly found in the camel. The third cavity, or stomach, is the *manyplies* (Lat. *psalterium*), so called because its lining membrane forms many deep folds, like the leaves of a book, beset with small hard tubercles. This also communicates directly with the esophagus, by a sort of prolongation of it. The leaves of the membrane seem to serve for the absorption of superfluous fluid from the food. Finally, the food passes into the fourth cavity, which is of a more elongated form than any of the others, and is next in size to the first. This is called the *reed* or *rennet* (Lat. *abomasus*). It may be considered as the true stomach, homologous—if any one of the four parts can be so regarded—to the simple stomach of mammals in general. It is lined with a velvety mucous membrane in longitudinal folds. It is here that the gastric juice is secreted. In young animals it is the largest of the four cavities, and it is only when they pass from milk to crude vegetable food that the paunch becomes enlarged, and all the parts of the complex stomach come fully into use. It seems to be by a power of what may be called instinctive volition that the animal directs what passes through the gullet into the first cavity, the second, or even the third. It has been found by M. Flourens, who made many experiments on this subject, that the food consumed by ruminants passed chiefly into the first cavity, but part of it also at once into the second, and even, when it was given in a *mashed* or in a much comminuted state, into the third.

The particular means by which hastily swallowed food is brought from the paunch, formed into pellets at the base of the esophagus, and brought up into the mouth for rumination, or second and more thorough mastication, are not yet very thoroughly understood, notwithstanding the patient investigations of M. Flourens. He ascribes the formation of the pellets, however, to the action of the muscular duct which connects the esophagus with the second and third stomachs, and the power which the animal has of closing or opening at will the orifices of these cavities.

Chewing of the cud is very generally performed in an attitude of repose, and evidently affords great pleasure to the animal.

The ruminantia are arranged by naturalists in seven families, all very natural—*camelidæ* (see CAMEL), *moschidæ* (see MUSK), *cervidæ* (see DEER), *camelopardidæ* (see GIRAFFE), *antilopidæ* (see ANTELOPE), *bovidæ* (q.v.), and *capridæ* (q.v.). The most important genera and species are separately noticed.

RUMP PARLIAMENT. In order to bring about the condemnation of Charles I., Oliver Cromwell, on Dec. 6, 1648, sent two regiments, under the command of col. Pride, to coerce the house of commons. Forty-one members of the "long parliament" who were favorable to accommodation were imprisoned in a lower room of the house, 160 were ordered to go home, and only 60 of the most violent of the independents were admitted. The clearance was called *Pride's purge*, and the privileged members ever afterward passed by the name of the *rump*, forming, as it were, the fag-end of the "long parliament." This assembly, in conjunction with the army, brought about the arraignment, trial, and condemnation of Charles I. Five years later the "rump parliament," forgetting that it was but the creature of the army, attempted to make a stand against certain demands on the part of the soldiers. The result was that Cromwell filled the house with armed men; the speaker was pulled out of the chair, the mace taken from the table, the room cleared, the door locked, and the parliament declared to be dissolved. Supreme in the three kingdoms, Cromwell convoked an assembly which assumed the title of parliament, and acquired from the name of one of its most prominent members, a leather-seller, called Praisegod Barebones, the name of the *Barebones parliament*. The Barebones parliament, after subsisting five months, was dissolved, and Cromwell, raised to the dignity of protector, convoked two parliaments, and dissolved them for refusing to sanction his measures. On Oliver Cromwell's death, and Richard's succession to the protectorate, the military malcontents, coalescing with the independents in Richard's parliament, declared the expulsion of the rump illegal, and restored that assembly to its functions. With the revival of the rump, its quarrel with the army revived; and the troops, again surrounding Westminster hall, expelled it on Oct. 30, 1659, a provisional government of officers assuming the direction of affairs. But the general dissatisfaction having led to a coalition between the Presbyterians and royalists, the army, unable to carry on the government, was reduced to the necessity of once more restoring the rump, which had been twice ignominiously expelled. The advance of Monk, however, with the army of Scotland led to a general cry throughout the country for a free parliament. A number of the members who had been excluded by Pride's purge reappearing in the house, placed the independents in the minority; and on Mar. 16, 1660, the despised and derided rump at last solemnly decreed its own dissolution. The most prominent members of the rump parliament were Vane and Hazlerig.

RUMSEY, JAMES, 1743–92; b. Md.; studied mechanics and machinery, and became an inventor. In 1784, 23 years before Fulton built the *Clermont*, Rumsey exhibited on the Potomac, in the presence of Washington, a boat propelled by machinery. In 1786 he exhibited a boat in which a pump worked by steam-power drove a stream of water from the stern, and thus furnished the motive-power. A society was formed to aid his project, of which Franklin was a member. He visited and gave exhibitions in England, and obtained patents for his invention in Great Britain, Holland, and France. His death occurred while he was preparing for further experiments. He also made improvements in mill machinery, and in 1788 published a *Short Treatise on the Application of Steam*.

RUM SHRUB, a liqueur in which the alcoholic base is rum, and the other materials are sugar, lime or lemon juice, and the rind of these fruits added to give flavor. Almost every maker has his own receipt, and much credit is assumed by each for his own special mixture.

RUNCORN, a thriving market and manufacturing t. and river-port of Cheshire, on the left bank of the Mersey, 12 m. s.e. of Liverpool. There is a station of the Northwestern railway on the Lancashire side of the river, and the town is the terminus for the Bridgewater and the Mersey and Irwell canals. It is a free port, has a custom-house, and contains iron-foundries, soap and chemical works, ship-building yards, etc.; and in the vicinity are collieries, and slate and freestone quarries. Large quantities of freestone are shipped for distant ports. In 1864, 4,566 vessels, of 278,000 tons, entered and cleared the port. Pop. '51, 8,049; '61, 10,434; '71, 12,443.

RU'NEBERG, JOHANN LUDWIG, 1804–77; b. Finland; graduated at the university of Abo; in 1842 appointed professor of Greek literature at the gymnasium of Borgo. His writings are in the Swedish language, and mainly lyrical, though his drama *Kungarne Pa Salamis* (1863) is a work of merit. His idyls and versified stories are popular throughout Norway, Sweden, and Denmark. His most famous work is *Fännrik Stols Sägner* (1844), ballads on the war between Russia and Sweden.

RUNES, the earliest alphabet in use among the Teutonic and Gothic nations of northern Europe. The exact period of their origin is not known. The name is derived from the Teutonic *rûn*, a mystery, whence *runa*, a whisper, and *helrûn*, divination; and the original use of these characters seems to have been for the purposes of secrecy and divination. The resemblance which some of the runic characters bear to the Phenician alphabet and others derived from it, has led to the supposition that they were first introduced by Phenician merchants who traded with the coasts of the Baltic; and while the mass of the people were allowed to possess but a very partial acquaintance with them, the priests systematized them and retained a full knowledge of them in their own hands, no doubt finding them useful in establishing a reputation for superior power and intelligence. Scandinavian and Anglo-Saxon tradition agree in ascribing the invention of runic writing to Odin or Wodin. The countries in which traces of the use of runes exist include Denmark, Norway, Sweden, Iceland, Germany, Britain, France, and Spain; and they are found engraved on rocks, crosses, monumental stones, coins, medals, rings, brooches, and the hilts and blades of swords. Runic letters were also often cut on smooth sticks called *rûn-stafas*, or mysterious staves, and used for purposes of divination. But there is no reason to believe that they were at any time in the familiar use in which we find the characters of a written language in modern times, nor have we any traces of their being used in books or on parchment. We have an explanation of the runic alphabet in various MSS. of the early middle ages, prior to the time when runes had altogether ceased to be understood.

The systems of runes in use among the different branches of the Teutonic stock were not identical, though they have a strong general family likeness, showing their community of origin. The letters are arranged in an order altogether distinct from that of any other alphabetical system, and have a purely Teutonic nomenclature. Each letter is, as in the Hebrew-Phenician, derived from the name of some well-known familiar object, with whose initial letter it corresponds. Runes being associated in the popular belief with augury and divination, were to a considerable extent discouraged by the early Christian priests and missionaries, whose efforts were directed to the supplanting of them by Greek and Roman characters. But it was not easy suddenly to put a stop to their use, and we find runes continuing to be employed in early Christian inscriptions. This was to a remarkable extent the case in the Anglo-Saxon kingdoms of Northumbria, Mercia, and East Anglia, where we have traces of runic writing of dates varying from the middle of the 7th to the middle of the 10th century. Its continued prevalence in this particular district has been accounted for by the fact that, after the death of Edwin and the flight of St. Paulinus, the restoration of Christianity in Northumbria was effected by missionaries of the Irish school, whose predecessors had adopted the policy, not, like Augustine and his brethren, of destroying the monuments of pagan antiquity, but of allowing them to remain, and consecrating them by marking them with the symbols of Christianity. Runes are said to have been laid aside in Sweden by the year 1001, and in Spain they were officially condemned by the council of Toledo in 1115.

The different systems of runes, all accordant up to a certain point, have been classed as the Anglo-Saxon, the German, and the Norse, each containing different subordinate varieties. The Norse alphabet is generally considered the oldest and the parent of the rest. It has 16 letters corresponding to our *f, u, th, o, r, k, h, n, i, a, s, t, b, l, m, y*, but has no equivalent for various sounds which existed in the language, in consequence of which the sound of *k* was used for *g, d* for *t, b* for *p*, and *u* and *y* for *v*: *o* was expressed by *au*, and *e* by *ai, i*, or *ia*; and the same letter otherwise was made to serve for more than one sound. Other expedients came, in the course of time, to be employed to obviate the deficiency of the system, as the addition of dots and the adoption of new characters. But the runic system received a fuller development among the Germans and Anglo-Saxons, particularly the latter, whose alphabet was extended to no fewer than 40 characters, in which seem to have been embraced, more nearly than in any modern alphabets, the actual sounds of a language. Till recently the Norse runes had been most studied; but of late the Anglo-Saxon have become the subject of considerable attention. The table on the opposite page exhibits the best-known forms of the Anglo-Saxon, German, and Norse runic alphabets, with the names and the power of the several letters. The Anglo-Saxon runes, as here given, are derived from a variety of MS. authorities, the most complete containing forty characters, while some only extend as far as the twenty-fifth or twenty-eighth letter. Neither the name nor the power of some of the later letters is thoroughly known, and they are without any equivalents in the Norse runic system. The German runes are given from a MS. in the conventual library of St. Gall in Switzerland. Though the various runic alphabets are not alike copious, the same order of succession among the letters is preserved, excepting that, in the Norse alphabet, *laugr* precedes *madr*, although we have placed them otherwise, with the view of exhibiting the correspondence of the three systems. The number of characters in the Anglo-Saxon alphabet is a multiple of the sacred number eight; and we have the evidence both of a Swedish bracteate containing twenty-four characters, and of the above-mentioned St. Gall MS., that there was a recognized division of the alphabet into classes of eight letters —a classification which forms the basis of a system of secret runes noticed in that MS. Of these secret runes there are several varieties specified: in particular 1. *Is-runa* and

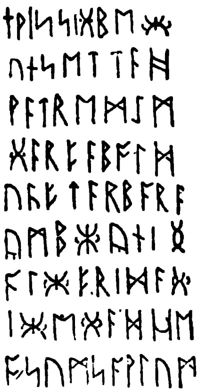
Lago-runa (of which specimens exist in Scandinavia), consisting of groups of repetitions of the character *iis* or *lago*, some shorter and some longer, the number of shorter characters in each group denoting the class to which the letter intended to be indicated belonged; the number of longer ones, its position in the class. 2. *Hahal-runa*, where the letters are indicated by characters with branching stems, the branches to the left denoting the class,

ANGLO-SAXON.			GERMAN.		NORSE.	
ᚠ	feoh	f	ᚠ	feh	ᚠ	fé
ᚢ ᚢ	ur	u (short)	ᚢ	uur	ᚢ	ur
ᚦ	thorn	th	ᚦ	dorn	ᚦ	thurs
ᚩ ᚨ	os	o (short)	ᚨ	oos	ᚬ	os
ᚱ	rad	r	ᚱ	rat	ᚱ	ridr
ᚳ	cæn	k	ᚳ	cen	ᚴ	kaun
ᚷ	gyfu	g	ᚷ	gebo		
ᚹ	wen	w	ᚹ	buun		
ᚻ	hægel	h	ᚻ	hagal	ᚼ	hagl
ᚾ	nyd	n	ᚾ	nod	ᚾ	naud
ᛁ	is	i (short)	ᛁ	iis	ᛁ	is
ᛄ	gear	y (cons.)	ᛄ	ger	ᛅ	as
ᛇ	eoh	e (long)	ᛇ	ih		
ᛈ ᛈ	peorth	p	ᛈ	perd		
ᛉ	eolhx	x	X	elix		
ᛋ	sigel	s	ᛋ	sigi	ᛋ	sol
ᛏ	tir	t	ᛏ	ti	ᛏ	tyr
ᛒ	beorc	b	ᛒ	borg	ᛒ	biarkan
ᛖ	eh	e (short)	ᛖ	eh		
ᛗ	man	m	ᛗ ᛞ	man	ᛘ	madr
ᛚ	lagu	l	ᛚ	lago	ᛚ	laugr
ᛝ ᛝ	ing	ng	ᛝ	inc		
ᛞ	dæg	d	ᛞ	tag		
ᛟ ᛟ	œthel	o (long)	ᛟ	odil		
ᚪ ᚨ	ac	a (long)	ᚨ	ac	ᛦ	yr
ᚫ	æsc	a (short)	ᚫ	asc		
ᚣ ᚣ	yr	y	ᛈ	yur		
ᛠ	ear	au	ᛠ	der		
ᛡ	ior	io				
ᛢ ᛢ	queorn	q				
ᛣ ᛤ	calc					
ᛥ	stan	st				
ᚸ ᚸ	gar	dzh				
Z		s				
ᛟ						
ᚱ						
ᚴ	vult	v				
ᛞ						
ᛞ						
ᛏ						

and those to the right the position in that class. There is an inscription in secret runes of this description at Hackness in Yorkshire. 3. *Stof-runa,* in which the class is indicated by points placed above, and the position in the class by points below, or the reverse.

The best known inscriptions in the Anglo-Saxon character are those on two gravestones at Hartlepool in Northumberland, on a cross at Bewcastle in Cumberland, and on another cross at Ruthwell in Dumfriesshire. The inscription on the w. side of Bewcastle cross, which we give as a specimen of Anglo-Saxon runes, is a memorial of Alcfrid, son of Oswiu, who was associated with his father in the government of the kingdom of Northumbria, in the 7th century.

It has been thus deciphered into the Anglo-Saxon dialect of the period:



Runes.

+ THIS SIGBECUN
SETTÆ HWÆTRED
ĒM GÆRFÆ BOLDU
ÆFTÆR BARÆ
YMB CYNING ALCFRIDÆ
GICEGÆD HEOSUM SAWLUM.

Or in modern English:

This memorial
Hwætred set
and carved this monument
after the prince
after the king Alcfrid,
pray for their souls.

The inscription on the Ruthwell cross, after being long a puzzle to antiquaries, was first deciphered in 1838 by Mr. John M. Kemble, an eminent Anglo-Saxon scholar. It is written alternately down one side of the stone and up another, and contains a portion of a poem on the subject of the crucifixion. Mr. Kemble's interpretation received a very satisfactory confirmation by the discovery of a more complete copy of the same poem in a MS. volume of Anglo-Saxon homilies at Vercelli.

Mr. D. H. Haigh, whose researches have added much to our knowledge of Anglo-Saxon runes, has endeavored to set up for them a claim of priority over the Norse characters. Instead of considering the additional Anglo-Saxon letters as a development of the Norse system, he looks on the Norse alphabet of sixteen letters as an abridgment of an earlier system, and finds occasional traces of the existence of the discarded characters in the earliest Norse inscriptions, and in the Scandinavian *Iis-runa* and *Hahalruna*, where the letters are classified in accordance with the Anglo-Saxon groups of eight.

The Scandinavian kingdoms contain numerous runic monuments, some of them written *boustrophedon,* or with the lines beginning alternately from the right and left; and there are many interesting inscriptions on Swedish gold bracteates, generally having reference to some design which they accompany. The Celtic races, from their connection with the Scandinavians, became acquainted with their alphabet, and made use of it in writing their own language; and hence we have in the western islands of Scotland, and in the Isle of Man, runic inscriptions, not in the Anglo-Saxon, but in the Norse character, with, however, a few peculiarities of their own. Some of the most perfect runic inscriptions are in Man; others of a similar description exist at Holy island, in Lamlash bay, Arran, and there is an inscription in the same character on a remarkable brooch dug up at Hunterston, in Ayrshire. Dr. D. Wilson considers that the Celtic population of Scotland were as familiar with Norse as the Northumbrians with Saxon runes.

We sometimes find the Norse runes used to denote numerals, in which case the sixteen characters stand for the numbers from 1 to 16; *ar* combined with *laugr* stands for 17, double *madr* for 18, and double *tyr* for 19. Two or more letters are used to express higher numbers, as *ur ur*, 20; *thurs thurs os*, 34.

See Planta's essay, *On the Runic or Scandinavian Language;* W. C. Grimm, *Ueber Deutsche Runen; Archæologia,* vol. 28; Haigh's *Anglo-Saxon Conquest of Britain;* Dr. D. Wilson's *Prehistoric Annals of Scotland;* the Danish works of Worsaae and Wimmer.

The term Runic Knotwork is often applied loosely and inaccurately to a kind of interlaced ornamentation to be seen in MSS. and on monuments of Anglo-Saxon, Norman, Scandinavian, Scoto-Irish, and Pictish origin, from the 6th to the 12th century.

RUNGPUR', a British district of India, in the presidency of Bengal, bounded on the e. by the Brahmaputra, and on the n. by the protected state of Cush Behar. Area, 3,476 sq.m.; pop. '71, 2,149,172. The surface is so low that a large proportion of it is inundated during the rains. Indigo, for the manufacture of which there are numerous large factories in the district, is the great article of export.

RUNJEET-SINGH, Maharajah of the Punjab (generally described by English writers as the *king of Lahore*), was b. at Gugaranwalla, Nov. 2, 1780. His father, Maha-Singh, was sirdar of Kukur-Chukeah, one of the twelve missouls or military organizations of the Sikhs, and died when Runjeet-Singh was about 12 years old, leaving a full treasury and a well-regulated government. His widow took charge of the administration, and attempted by every means in her power to render her son effeminate, but Runjeet-Singh's character was not capable of being weakened by such treatment. When about 17 years old his mother died suddenly (poisoned, as it is reported, by her son), and he immediately assumed the government. Runjeet-Singh now showed himself to be a prince of overwhelming ambition, and capable of attaining his object either by policy and address, or by force. In 1799, having rendered important service as an ally to Zemân Shah of Afghanistan, who had invaded the Punjab, he received from that monarch liberty to take possession of Lahore, which he accordingly did, and held it, despite the utmost efforts of his brother sirdars. To these quarrelsome neighbors he next turned his attention, and succeeded in subduing some and rendering others tributary, so that by 1809 he had greatly reduced their number. His successes having alarmed the Sikh chiefs, situated between the Sutlej and the Jumna, they besought the governor-general's interference, and this was the only occasion on which he ever came into collision with the British. Arrangements were amicably made, and Britain gave up all pretension to interference north of the Sutlej, on condition that that boundary should be carefully respected. Runjeet-Singh, thus freed from the only danger he feared, pursued his schemes of aggrandizement; and in 1812, having compelled all but three of the Punjab sirdars to resign their authority, he organized the whole under one sovereignty, and proclaimed himself *rajah*. His army had for several years previously been organized and disciplined according to the European fashion by English officers who had entered his service, so that the wild and undisciplined troops of the neighboring states had not a chance of successfully opposing him. About this time his capital was resorted to by two of the dispossessed rulers of Afghanistan, one of whom, Shah-Sujah, was the possessor of the celebrated *Koh-i-nûr* (q.v.), which prize Runjeet-Singh eagerly coveted, and at last obtained as the price of his assistance in recovering the throne of Cabul. In 1818 Runjeet-Singh obtained possession of Attock, took Mûltan by storm in 1817, and in 1819 annexed Cashmere, assuming after these exploits the title of *maharajah*. In 1822 he took into his service Allard and Ventura, two French officers who formerly served under Napoleon, and by their aid he finished the reconstruction of his army, with the view of extending his dominion to the west of the Indus. In pursuance of this scheme, he wrested (1829) from the Afghans the province of Peshawur. He had now an extensive territory, peopled by more than 20,000,000, and a well-trained army of 70,000 men, of whom 36,000 were infantry, thoroughly disciplined, and this numerous host was employed for several years in desultory wars with the Afghans. Between him and the British there was always a mutual distrust, dissembled by the show of extreme cordiality; but as both parties scrupulously abstained from any cause of offense, pacific relations were never interrupted. In 1836 his army was totally defeated by the Afghans, but this reverse seems not in the slightest degree to have affected the stability of his rule, even in the most recently acquired districts; and, strange to say, his long reign was not disturbed by a single revolt. He died June 27, 1839. Runjeet-Singh is one of the most remarkable men in eastern history; in person he was short and slight; his countenance, deeply marked with small-pox (which had deprived him of the sight of one eye), was, however, expressive of strong determination, to which the calm of his brilliant dark eye lent additional effect. He was totally uneducated; could neither read nor write; yet the indefatigable energy of his administration, and his clemency and moderation (rare qualities in an Asiatic despot), are without a parallel in the east. See *English Cyclopædia;* Cuvilier-Fleury, *Notes Historiques sur le Général Allard; Revue Britannique*, vols. x., xiii., xxiii., and xxvii.

RUNKLE, JOHN DANIEL, PH.D., LL.D., b. New York, 1822; studied and taught school, and entered the Lawrence scientific school, Cambridge, 1848; was employed, 1849, as assistant in the preparation of the *American Ephemeris and Nautical Almanac;* graduated from the scientific school, 1851. He published valuable astronomical tables in the *Smithsonian Contributions*. He was the founder of the *Mathematical Monthly*, which he edited in 1859–61. In 1865 he accepted the chair of mathematics and analytic mechanics in the Massachusetts institute of technology, Boston; was acting president, 1868, and president 1870.

RUNNELS, a co. in w. central Texas; drained by the Colorado and Red Fork rivers; 1000 sq.m; in the census of 1870 returned as having no pop.; in '80, 980—380 of American birth, 13 colored. There is some stock-raising. Co. seat, Runnels.

RUNNER (*flagellum*, a whip), in botany, is a long slender branch proceeding from a lateral bud of a herbaceous plant with very short axis, or in popular language, without stem. It extends along the ground, and produces buds as it proceeds, which often take root and form new plants. Strawberries afford a familiar example. Another is found in *potentilla anserina*. Runners are common in the genus *ranunculus*.

RUNNERS. See KIDNEY BEAN.

RUNNIMEDE, a long stretch of green meadow, lying along the right bank of the Thames, from which it is partly concealed by plantations of willows, 20 m. w.s.w. of London. It is proposed to derive the name from the Sax. *rhynes*, water-brooks, which abound in these meadows; others suppose the word to be *runningmead*, referring to the horse-races which appear to have been held here from time immemorial, and which still take place in the month of August. Runnimede is of great historical interest, from the fact that Magna Charta was signed by king John, June 15, 1215, either on this meadow, or on Charter island, lying a short distance off the shore. The great charter itself professes to have been signed *per manum nostram in prato quod vocatur Runnimede.* See MAGNA CHARTA.

RUNRIG LANDS, a peculiar species of property known in Scotland, by which alternate ridges of land belong to two individuals respectively. The origin of holding lands in this way is said to have arisen out of the practice of common defense and watching, and the common plowing and laboring necessary or natural in the occupation of burgh acres and lands near towns. Each party is absolute proprietor of his own ridge; but owing to the obstruction often caused to agricultural improvement, a mode of compulsory division or allotment of the lands was introduced by statute in 1695. This remedy, however, does not apply to burgh acres, or to patches of land less than four acres in extent.

RUPEE' is the name of a silver coin current in India, of the value of 2s. English. The word is a corruption of the Sanskrit *rûpya*, from *rûpa*, shape, form, meaning, according to Pân'ini, a coin—not necessarily of silver—on which the shape *of a man*, according to the Kâs'ikâ commentary on this grammarian, is struck; and if this ellipsis of the word *man* is correct, as it very probably is, the word rupee would be of great numismatic interest, inasmuch as it would prove that even as early as at the time of the grammarian Pân'ini (q.v.) coins existed with a *human* figure impressed on them. The coin bearing the name of rupee was first struck by Shir Shah, and was adopted by Akbar and his successors; it was of the weight of 175 grains troy, and was considered to be pure; but in the decline of the Mohammedan empire, every petty chief coined his own rupee, varying in weight and value, though usually bearing the name and titles of the reigning emperor. In the reign of Shah Aalam, a great variety of coins bore his name and the years of his succession, until 1778, when they were suppressed in the territories subject to the East India company, and a rupee was struck, called the Sicca rupee, with an inscription on it, which, translated, runs: "The king, Shah Aalam, the defender of the faith of Mohammed, the shadow of the grace of God, has struck this coin, to be current through the seven climes;" and on the reverse: "Struck at Murshidabad, in the 19th year of the auspicious accession." Though rupees were coined also at Dacca, and finally only at Calcutta, and also at various dates, the place of coinage (the mint of Murshidabad) and the date just named (the 19th of Shah Aalam's reign) remained unaltered, in order to put a stop to the practice which money-changers had introduced, of levying an arbitrary rate of discount on rupees of different places of coinage and of previous dates, without reference to any actual diminution of weight by wear. Although the Dacca rupee was thus the actual medium of exchange, the company's accounts were for a long time kept in a different valuation, or that of the *Chalani*, or current rupee, 100 Sicca rupees being reckoned as equivalent to 116 Chalani rupees. The Sicca rupee served also as a unit of weight—80 Sicca weight being equal to one *ser*, and 40 sers to one *man* or *maund* = 82 lbs. Besides the Sicca rupee, two other rupees were current in the Bengal presidency—the Benares rupee, which ceased to be struck in 1819, and the Farakhabad rupee. At Madras the rupee of the Nawabs of the Carnatic, originally struck at Arcot, and at Bombay that of the Nawabs of Surat, became the currency of the company. In 1818 the standard of the Sicca and Farakhabad rupees was altered, but their intrinsic value was unaffected, as they continued to have the same amount of fine silver. Other changes of these coins took place—of the latter in 1824, of the former in 1833; but in 1835 the coinage of the company was entirely remodeled, and a coin, thenceforth termed the company's rupee, with its proportionate subdivisions, was struck to replace all the former currencies, being of the same weight and fineness throughout, and bearing inscriptions in English, or on one face the head and name of the reigning sovereign of Great Britain and Ireland, and on the reverse the designation of the coin in English and Persian, with the words "The East India Company" in English. The latter, of course, have disappeared since India has been placed under the direct government of the English crown. The weight, intrinsic purity, and value of the British currency of these several coins were till lately:

		Weight.	Pure Contents.	
		Troy Grains.	Troy Grains.	s. d.
Sicca Rupee	1773	179.666	175.923	2 2
" "	1818	191.916	175.923	2 2
" "	1823	192.000	176.000	2 2
Benares	1806	174.760	167.000	2 0¾
Farakhabad	1803	173.000	165 215	2 0½
"	1819	180.234	165.215	2 0½
"	1824	180.000	165.000	2 0½
Madras	....	176.400	166.480	2 0¾
"	1818	180.000	165.000	2 0½
Bombay	1800	179.000	164.680	2 0½
"	1829	180.000	165.000	2 0½
East India Company's	1835	180.000	165.000	2 0½

But as silver is subject, in the London mint, to a seigniorage of nearly 6 per cent, the London mint produce of the rupee, if of full weight (11 dwts. fine), should be 1s. 11d. Owing to the depreciation of silver, the value of the rupee has fallen; the *Sicca* rupee is now quoted only at 2s.

RUPERT, Prince, the son of the elector-palatine Frederick V., and Elizabeth, daughter of James I. of England, was born in 1619. In 1642 he received from his uncle, Charles I. of England, a commission to command a regiment of horse at Worcester against the parliamentarians. The impetuosity with which he charged the enemy there, and in the battle of Edgehill, would have proved of greater use to the royalists had not his rashness in pursuing the wavering foe nearly counteracted the advantages which he had already gained. Subsequently, at Chalgrove, Newark, and Newbury, he was more successful; but his petulant disregard of orders, and his hasty retreat from the field of battle at Marston moor, resulted in a signal defeat, the consequences of which had a most disastrous effect upon the fortunes of the royalist party. His conduct at Naseby, and his hasty surrender of the city of Bristol, irritated the king, who forthwith deprived him of his command, and requested him to leave England without delay. In 1648, however, he was recalled and appointed to the command of the royal fleet. In this new vocation he acquitted himself with much daring and somewhat more caution, and for three years he kept his ships afloat, after escaping the blockade in which he had been held for a twelvemonth off the Irish coast by the great parliamentarian admiral Blake; but in 1651 the latter attacked the prince's squadron, and burned or sunk most of his ships. With the few vessels still remaining to him, Rupert escaped to the West Indies, where, in concert with his brother Maurice, he led a buccaneering life, maintaining himself and his men by seizing upon English and other merchantmen. After a few years spent in this manner, Rupert managed to elude the vigilance of Cromwell's captains, and made good his way to France, where he remained till the restoration of his cousin, Charles II. Rupert served with distinction under the duke of York, and in concert with the earl of Albermarle, against the Dutch, and died in 1682 in the enjoyment of various offices and dignities, being a privy-councilor, a member of the admiralty, governor of Windsor castle, etc. The last ten years of his life were spent in retirement in the pursuit of chemical, mechanical, and physical researches, for which he evinced considerable aptitude. Although it is certain that he did not discover the art of engraving in mezzotinto—the real inventor of which appears to have been a German, Von Tregen, whose early works bear the date of 1642—Rupert no doubt improved the mechanical mode of the art, which he described and illustrated for the royal society of London in 1662, after he had completed several interesting engravings on the new principle. The glass bead known as prince Rupert's drop (q.v.) derives its name from the prince.

RU'PERT'S LAND, so called from prince Rupert (q.v.), who was one of the founders of the Hudson's Bay company, was formerly the official designation of that extensive tract which forms the basin of Hudson's bay and strait, and is bounded on the w., s., and n. by the water-sheds of the Arctic, St. Lawrence, and Atlantic rivers. The western boundary is from Deer lake to a point a little to the w. of the Red river settlement (q.v). In 1870 the territory held by the Hudson's Bay company was admitted into the dominion of Canada, a portion of Rupert's land falling within the province of Manitoba. The whole of the vast territory known as Rupert's Land slopes inward toward Hudson's bay, and is well supplied with navigable rivers. The mountains of this region, which are chiefly on the boundaries, are of primitive rock, and a great portion of the country is densely wooded. The soil is rich, but on account of the severity of the climate—which is not only of a generally low temperature, but exceedingly variable in summer and autumn—the cereals and other alimentary plants are not cultivated to any extent; in fact, they are only planted in the neighborhood of the trading-posts of the Hudson's Bay company (q.v.) and in the agricultural settlement on Red river, in the s.w. In the n. the vegetation and climate are those of the polar regions. The chief dependence of the inhabitants of Rupert's Land for food and clothing is on the animal kingdom, which is here most abundantly represented. Beavers are still found, and bears, otters, martens, and musk-rats are abundant, their skins forming the chief commercial product of the country. There are also abundance of foxes of various colors, bears, wolves, Canadian lynxes, etc. Among the animals used for food are the wapiti, reindeer, moose, and other species of deer; the musk-ox, hares, and an immense variety of wood-fowl and other birds. The numerous rivers and lakes are abundantly stocked with fish. The population, which is scanty, is composed of British or Canadians, and aboriginal tribes.

RU'PIA is a somewhat severe form of skin disease. It is characterized by flattish, distinct *bullæ* or blebs, containing a serous, purulent, or sanious fluid, which become changed into thick scabs. Several varieties of this disease have been established by dermatologists. In its simplest form, the blebs are not preceded by any inflammatory symptoms, are about an inch in diameter, and contain a fluid which is originally thin and transparent, but soon thickens, becomes purulent, and dries into brown ragged scabs, which are elevated in the center. The scabs are easily separated, and leave ulcerated surfaces, on which several successive scabs usually form before healing ensues. In a more severe form, known as *rupia prominens*, the scab projects so much in the center as to resemble a limpet-shell in form.

Rupia is a chronic disease, and is usually limited to the limbs, the loins, and the nates. It is not contagious, and generally attacks persons debilitated by old age, intemperance, bad living, or previous diseases, especially small-pox, scarlatina, and syphilis. The general treatment consists mainly in the administration of tonics, such as quinia, the mineral acids, ale, wine, animal food, etc. Some writers strongly recommend the tincture of serpentaria; and there is no doubt that certain cases which will not yield to tonics, rapidly improve when treated with iodide of potassium. The local treatment consists in puncturing the blebs as soon as they arise, in removing the scabs by poulticing, and in applying a slightly stimulating application—such as a solution of nitrate of silver—to the subjacent ulcers. The disease is frequently tedious and obstinate, but the patient almost always ultimately recovers.

RUPPIN', Neu, a t. of Prussia, in the province of Brandenburg, on a small lake of the same name, which communicates by water with the Elbe, 38 m. n. of Potsdam. It contains a castle, a lunatic asylum, and (1875) 12,501 inhabitants, who are engaged in brewing, spinning, and the manufacture of linen and woolen cloths.

RUPTURE. See Hernia.

RURAL DEAN, an official, ordinarily a beneficed clergyman, appointed in a diocese to maintain in a certain district, called a deanery, a supervision over the condition of churches, church furniture, glebe houses, schools, the appliances of public worship, and all other things appertaining to the service, and to report on all to the bishop as occasion may arise.

RURIK, who is considered to have been the founder of the Russian monarchy, was, according to most authors, a "Varangian" of Scandinavian origin, who was invited by the Slaves of Novgorod to come and rule over them; according to others, he was the chief of a tribe of Norse colonists which was located near the gulf of Finland, and, after a long contest, succeeded in subduing the northern Slaves and some neighboring tribes of Finns; while Kostomarof attempts to prove that he was a Lithuanian. That he was either a Scandinavian or of Scandinavian origin, there seems to be very little doubt, and it is as generally maintained that, accompanied by his brothers, Sindf (Sineous) and Truvor, he, at the head of a small army, took possession of the country to the s. of the gulf of Finland, lakes Ladoga, Onega, and Beloe in 861 or 862, and laid the foundation of a monarchy. His brothers afterward settled, the one at Bielo-ozero, and the other at Izborsk; but dying without issue, their principalities were united to Novgorod by Rurik. Novgorod was made the seat of government in 864 or 865, and the various insurrections of his Slavic subjects were quenched in blood, Vadim, their leader, whose valor is celebrated by the ancient chroniclers, perishing by Rurik's own hand. To secure himself and his descendants in their newly-acquired territory, Rurik invited various colonies of Varangians to settle in the country, and after reigning peaceably from this time, he died in 879. During his reign some of the Varangians attempted a land expedition against Constantinople, but renouncing the scheme, settled on the banks of the Dnieper, and founded the little state of Kiev. The family of Rurik reigned in Russia till the death, in 1598, of Feodor, son of Ivan the terrible, when, after a brief intestine contest, it was succeeded by the nearly allied house of Romanoff (q.v.). Many noble families of Russia, such as Odojefski, Obolenski, Dolgorouki, Lfot, Belosselski-Beloserski, and Gagarin, are legitimately descended in the male line from Rurik; and the princes of Romodanofski-Lady-shenski are legitimate descendants in the female line.—See prof. Thomsen's lectures on this subject (1878).

RU'SA, a genus of *cervidæ*, or subgenus of *cervus* (see Deer), containing a number of species of deer, natives of the forests of the East Indies, which may be described as stags with round antlers, a snag projecting in front just above the base of each, and the top forked, but the antlers not otherwise branched. They are generally of large size, and among them are some of the finest kinds of Asiatic deer. The Great Rusa (*R. hippelaphus*) is supposed by some to be the *hippelaphus* of Aristotle; but his description is not complete enough to identify the species. It is a native of Java, Sumatra, etc., and is about the size of a large stag, with brown rough hair, the neck with a long mane. The Sambur or Samboo (*R. Aristotelis*) of India is a similarly large and powerful animal, and no Indian deer is more sought after by European sportsmen. It also is supposed by some to be the *hippelaphus* of Aristotle. The color is sooty brown, and the male has a mane. It is solitary in its habits, and delights in low forests where water abounds. The axis (q.v.) is very nearly allied to this genus.

RU'SCHENBERGER, William S. W., b. N. J., 1807; graduated at the university of Pennsylvania, 1830. He studied medicine, became a surgeon in the U. S. navy, and was fleet surgeon of the East India squadron which circumnavigated the world. He was at the head of the naval hospital in Brooklyn for four years. In 1854 he was chief surgeon of the Pacific squadron, was made commodore, and in 1869 retired. He wrote several books of travel and many scientific articles.

RUSCUS. See Butchers' Broom.

RUSH, *Juncus*, a genus of plants of the natural order *junceæ*, having a glume-like (not colored) perianth, smooth filaments, and a many-seeded, generally 3-celled capsule. The species are numerous, mostly natives of wet or marshy places in the colder parts of the world; some are found in tropical regions. Some are absolutely destitute of leaves, but have barren scapes (flower-stems) resembling leaves; some have leafy stems, the leaves rounded or somewhat compressed, and usually jointed internally; some have plane or grooved leaves on the stems; some have very narrow leaves, all from the root. The name rush perhaps properly belongs to those species which have no proper leaves; the round stems of which, bearing or not bearing small lateral heads of flowers, and popularly known as *rushes*, are used for plaiting into mats, chair-bottoms, toy baskets, etc. The Soft Rush (*J. effusus*) is a native of Japan, as well as of Britain, and is cultivated in Japan for making mats. In ruder times, when carpets were little known, rushes were much used for covering the floors of rooms; to which many allusions will be found in early English writers. The stems of the true rushes contain a large *pith*, or soft central substance, which is sometimes used for wicks of candles. There are 20 or 22 British species of rush, some of which are very rare, some found only on the highest mountains, but some are among the most common of plants. They are often very troublesome weeds to the farmer. Thorough drainage is the best means of getting quit of them. Lime, dry ashes, road scrapings, etc., are also useful. Tufts of rushes in pasture are a sure sign of insufficient drainage. Many marshy and boggy places abound in some of the species having leafy stems and the leaves jointed internally, popularly called *sprots* or *sprits*, as *J. acutiflorus*, *J. lamprocarpus*, and *J. obtusiflorus*. They afford very little nourishment to cattle; but are useful for making coarse ropes for ricks, etc., which are stronger than those made of hay.

RUSH, a co. in s.e. Indiana, crossed by the Cincinnati, Hamilton and Dayton, and the Jeffersonville, Madison and Indianapolis railroads; drained by the Blue river, and Flat Rock creek; 410 sq.m.; pop. '80, 19,238. The surface is mostly level, with considerable table-land, and with large forests of oak, ash, and sugar maple. The soil is fertile; the principal products are grain, hay, wool, butter, sorghum, and maple molasses; lumbering and stock raising are important industries. It contains woolen, saddlery, and wagon factories; flour and saw mills; and numerous brick-kilns. Co. seat Rushville.

RUSH, a co. in w. Kansas, intersected by Walnut creek, an affluent of the Arkansas river, and Big Timber creek in the n., a branch of the Smoky Hill river; 720 sq.m.; pop. '80, 5,490—4,186 of American birth, 5 colored. Its surface is composed of level plains, slightly undulating in the s., thinly timbered, with a fertile soil. Co. seat, La Crosse.

RUSH, Benjamin, m.d., an American physician, was b. near Philadelphia, Dec. 24, 1745, was educated at Princeton college, studied medicine in Philadelphia, London, Edinburgh, and Paris, and in 1769 was made professor of chemistry in the Philadelphia medical college, and became a contributor to medical literature. Elected a member of the continental congress, he advocated and signed the declaration of independence. In 1777 he was appointed surgeon-gen. and physician-gen. of the continental army. His duties did not prevent him from writing a series of letters on the constitution of Pennsylvania, which was changed by his influence. He resigned his post in the army, because he could not prevent frauds upon soldiers in the hospital stores. In 1785 he planned the Philadelphia dispensary, the first in the United States; and was a member of the convention which ratified the federal constitution. Retiring from politics, he became professer of the theory and practice of medicine in the Philadelphia medical college; and was so successful in the treatment of yellow fever in 1793 that he was believed to have saved the lives of 6,000 persons. His practice, in consequence, become so large that he prescribed for 100 patients a day, whom he saw even at his meals. Virulently attacked by Cobbett, who published a newspaper in Philadelphia, he prosecuted him for a libel, and recovered $5,000 damages. His medical works produced honors from several European sovereigns. The chief of them were *Medical Inquiries and Observations*, *Diseases of the Mind*, *Medical Tracts*, *Health*, *Temperance, and Exercise*. In 1779 he was appointed treasurer of the United States mint, which post he held until his death in Philadelphia, April 19, 1813.

RUSH, Richard, 1780–1859; b. Philadelphia; son of Dr. Benjamin Rush. He graduated from the college of New Jersey 1797; studied law: was admitted to the Philadelphia bar 1800. He defended Duane, editor of the *Aurora*, charged with libel on governor McKean. Attorney-gen. of Pennsylvania 1811. In the same year he was appointed comptroller of the U. S. treasury; U. S. attorney-gen. 1814–17: secretary of state *pro tem.* under president Monroe, and minister to England; secretary U. S. treasury under president Adams. He was appointed on a number of commissions to negotiate loans, establish state lines, etc., and obtain for the U. S. government the Smithsonian legacy from England, amounting to $515,169. He was minister to France 1847–49; retired in the latter year to private life at Sydenham near Philadelphia. In his contributions to the press he defended the war with England and opposed the U. S. bank. He compiled a new edition of the U. S. laws.

RUSH-NUT. See Cyperus.

RUSHWORTH, John, an English author, whose work entitled *Historical Collections of Private Passages of State, Weighty Matters in Law, and Remarkable Proceedings in Parliament*, is a most important contribution to our knowledge of the civil war and the events that led to it, belonged to an ancient family in Northumberland, and was born there about 1607. He studied at Oxford, but left the university without taking a degree, and settled in London as a barrister. His interest in political affairs was, however, so strong that he appears to have spent a great deal of his time, for many years, in attending the star-chamber, the court of honor, the exchequer chamber, parliament, etc., and in taking down short-hand notes of the proceedings. When the long parliament met in 1640, Rushworth was appointed assistant to Mr. Henry Elsyngne, clerk of the house of commons, an office which afforded him ample opportunities for adding to his *Collections.* He rendered a variety of important services to his party during the civil war. The restoration of Charles II., in 1660, was fatal to his fortunes. Though not molested, he was one of those to whom the "cold shoulder" was shown by the triumphant royalists. In 1677 sir Orlando Bridgman, lord keeper of the great seal, appointed the old man, now (it is conjectured) in straitened circumstances, his secretary; and curious to say, we find him, two years after, a member of parliament. In 1684, when he had reached the age of 77, he was arrested for debt, and imprisoned in the king's bench, where he died in 1690. His last years were rendered doubly miserable, partly by the loss of his understanding, and partly by his addicting himself to intemperance. Rushworth's *Historical Collections* were published in four parts. The first, embracing the period from 1618 to 1629, was published in 1659; the second, embracing the period from 1629 to 1640, in 1680; the third, embracing the next five years, in 1692; and the fourth, extending to 1648, in 1701. The whole was republished in 1721. The work has been violently attacked by royalist and high church writers, as unfair, and even false, but their charges have not been substantiated.

RUSK, a co. in central Dakota, having the Missouri river for its e. boundary, drained by the Moreau river intersecting it centrally; 1600 sq.m.; pop. '80, with three other counties, 676—484 of American birth, 81 colored. Its surface is undulating, rising in the w. into the Elk Ridge mountains. In the n.e. is Grand river agency; and the Sioux reservation occupies a large proportion of the soil, which in the bottom lands is very fertile. Cottonwoods and willows grow on the river banks, and pines on the highlands.

RUSK, a co. in e. Texas, having the Sabine river for its n.e. boundary, intersected by the International and Great Northern railroad; 800 sq.m.; pop.'80, 18,987—18,838 of American birth, 8,178 colored. It is drained by the Angelina river in the s.w., and other small creeks. The surface is hilly, the larger proportion covered with good building timber. The soil is adapted to the production of corn, cotton, sweet-potatoes, dairy products, and the raising of live stock. Mineral springs are found, and extensive beds of iron ore. It has broom factories and saw-mills. Co. seat, Henderson.

RUSKIN, JOHN, the most eloquent and original of all writers upon art, was b. in London in 1819. He studied at Christ Church, Oxford, where he gained the Newdigate prize for English poetry in 1839, and took his degree in 1842. The year following appeared the first volume of his *Modern Painters,* the primary design of which was to prove the infinite superiority of modern landscape-painters, especially Turner, to the old masters; but in the later volumes (the 5th and last was published in 1860), the work expanded into a vast discursive treatise on the principles of art, interspersed with artistic and symbolical descriptions of nature, more elaborate and imaginative than any writer, prose or poetic, had ever before attempted. *Modern Painters* was essentially revolutionary in its spirit and aim, and naturally excited the aversion and hostility of the conservatives in art. But the unequaled splendor of its style gave it a place in literature; crowds of admirers and disciples sprang up; the views of art enunciated by Ruskin gradually made way; and have largely determined the course and character of later English art. In 1849 appeared *The Seven Lamps of Architecture;* and in 1851–53, *The Stones of Venice,* both being efforts to introduce a new and loftier conception of the significance of domestic architecture. They were exquisitely illustrated by the author himself. About this time *pre-raphaelitism* began to develop itself as a distinctive phase of modern art, and Ruskin warmly espoused its cause. His letters to the *Times,* his pamphlet on the subject (1851), and his "Notes" on the royal academy exhibitions (1855–60), besides numerous casual expressions of opinion, bear testimony to the ardor and sincerity of his admiration. In 1854 he published four singularly pithy and ingenious *Lectures on Architecture and Painting* (previously delivered at the Edinburgh philosophical institution); and in 1858, two *Lectures on the Political Economy of Art* (previously delivered at Manchester). Works of perhaps lesser consequence are his *Notes* on Turner's pictures and drawings exhibited in Marlborough house (1857); *Elements of Drawing, in Three Letters for Beginners* (1857); *Elements of Perspective* (1859); *Unto this Last* (1862); *Study of Architecture in our Schools* (1865); *Crown of Wild Olive: Three Lectures* (1866); *The Queen of the Air, being a Study of the Greek Myths of Cloud and Storm* (1869); *Lectures on Art* (1870); *Munera Pulveris: Essays on Political Economy* (1872); *Aratra Pentilici: Lectures on the Elements of Sculpture* (1872), etc. A few years ago this prolific author started a periodical pamphlet, entitled *Fors Clavigera,* for the exposition of the multifarious application of his art-principles. From 1869 till 1879 he was Slade professor of fine arts at Oxford. In 1871 he gave £5,000 to endow a master of drawing in the Taylor galleries, Oxford. In the same year the university of Cambridge conferred on Ruskin the degree of LL.D.

RUSS, JOHN DENISON, b. Mass., 1801; educated at Yale college. He began the practice of medicine at New York in 1826, and after a residence of three years in Greece, where he established a hospital, he returned to this country, and was appointed superintendent of the New York institution for the blind. He invented an alphabet for the blind, and a simpler system of mathematical characters. He was one of the founders of the New York prison association; superintendent of the juvenile asylum 1851-58; and has taken an active part in other philanthropies.

RUSSELL, a co. in e. Alabama, having the Chattahoochee river for its e. boundary separating it from Georgia; 700 sq.m.; pop. '80, 24,840—24,793 of American birth, 18,660 colored. It is drained by Wetumpka, Uchee, and Cowikee creeks, and intersected by the Mobile and Girard railroad. The surface is uneven, largely covered with pine timber, having productive sections interspersed with barren tracts rising into rough ridges and sinking into sandy plains. The tillable lands yield grain, sweet-potatoes, and cotton, and there is good pasturage for live stock. Co. seat, Seale's Station.

RUSSELL, a co. in central Kansas, drained by the Saline and Smoky Hill rivers, affluents of the Kansas; 900 sq.m.; pop. '80, 7,351—6,171 of American birth, 34 colored. It is intersected by the Kansas Pacific railroad. Its surface spreads out into level fertile plains adapted to grain culture and stock-raising. Co. seat, Russell.

RUSSELL, a co. in s. Kentucky, intersected in the s. by the Cumberland river; 300 sq.m.; pop. '80, 7,591—7,589 of American birth, 354 colored. Its surface is hilly, timber covering the greater part. The soil under cultivation yields good crops of grain, tobacco, sorghum, and the products of the dairy. Much attention is paid to the raising of live stock. Co. seat, Jamestown.

RUSSELL, a co. in s.w. Virginia, having the Clinch mountains for its s. boundary, and the Dividing Ridge for its n., drained by Clinch river; 500 sq.m.; pop. '80, 13,906—13,901 of American birth, 1,271 colored. Its surface is diversified by fertile valleys producing grain, tobacco, wool, dairy products, flax, maple sugar, and sorghum. Live stock find excellent pasturage on the mountains, which are generally in the highest portions covered with a thick growth of maple, oak, hickory, and pine trees. Beds of iron ore, coal, and marble are found. Co. seat, Lebanon.

RUSSELL, a co. in e. Ontario, having the Ottawa river for its n. boundary; 686 sq. m.; pop. '71, 18,344. It is drained by Bear brook and Castor creek, affluents of the Petite Nation river. Its surface is level, well wooded, the soil is fertile, and it has an active lumber trade. Its courts are held in Prescott co., at the co. seat, L'Orignal.

RUSSELL, HOUSE OF. The first dukedom of Bedford (q.v.) expired in the person of the great regent of France (in the time of Henry VI.), with whom the present dukes are unconnected by affinity. The early descent of the Russells, and their derivation from the Du Rozels of Normandy, have been traced by Mr. Wiffen in his *Memoirs of the House of Russell*. This great historical family is said to derive its descent from Olaf, the sharp-eyed king of Rerik, in the 6th c., one of whose descendants, Turstain, a Scandinavian jarl, settled in Normandy, on its conquest by the Northmen, and became possessed of the barony of Briquebec, and the castle of Rozel, near Caen. In a charter of Matilda, wife of the conqueror, dated 1066, Hugh de Rozel appears as a witness, and is no doubt the same knight who accompanied William in his invasion of England, and assisted at the battle of Hastings. His name, together with that of his brother, are found on the roll of Battle Abbey. They both accompanied duke Robert of Normandy in the first crusade, where the elder died. The younger, Hugh de Rozel, upon his return from the Holy Land, established himself in England, and was the progenitor of sir James Rozel, or Russell (as it had then begun to be called), governor of Corfe Castle in 1221, and of sir W. Russell, who represented Southampton in the first parliament of Edward II. From the latter Russell directly descended sir John Russell, one of the most valiant soldiers of the age of chivalry. His son, sir John Russell, was speaker of the house of commons in the time of Henry VI. The high fortune and eminence of the house of Russell date from his grandson, JOHN RUSSELL, one of the most accomplished gentlemen of his time, who, in 1538, was elevated to the peerage, under the title of "lord Russell, baron Russell of Cheyneys, co. Buckingham." His son, the second earl, was a person of eminence in queen Elizabeth's reign, and was, like his father, a knight of the garter. The next notable member of the family was EDWARD RUSSELL, who was bred to the sea, and was groom of the bedchamber to the duke of York, afterward James II., but upon William Lord Russell's judicial murder retired from court. Strenuously supporting the revolution, he obtained high naval commands from William III., and distinguished himself as one of the most eminent naval heroes of the period, particularly by his victory over the French fleet at La Hogue in 1692. His cousin was—

LORD WILLIAM RUSSELL, son of William, 5th earl, who has left an unperishable name, as one of the most glorious martyrs of English liberty. He was born Sept., 1639; was educated at Cambridge; passed some years at Augsburg and other places on the continent, and returned to England at the restoration In 1678-79 he was returned to parliament for the co. Bedford. His first public act was worthy of his subsequent career. He inveighed against the corruption of the Cabal, the influence of France, the dishonorable commencement of the war with Holland, and the fraud practiced upon the bankers. He was ever afterward found conspicuous wherever the designs of the court could be traversed, or the cause of constitutional liberty befriended. He appeared publicly in the king's bench at Westminster hall, June 16, 1680, and presented the duke of York as a recusant. He also carried up to the house of lords the bill of exclusion against the duke, at the head of more than 200 members of the commons. This bill, setting forth that the duke of York was a papist, declared him incapable of succeeding to the crown. The king and duke determined to be revenged upon Russell and the other leaders of the whig party. Charged as participators in the Rye House plot (q.v.), lord Russell, the earl of Essex, and Algernon Sidney were arrested. Russell was, July 13, 1683, arraigned at the Old Bailey for high treason. Infamous witnesses easily satisfied a packed jury. As they were about to withdraw, the prisoner said: "I call heaven and earth to witness that I never had a design against the king's life." But the jury pronounced the fiat that condemned Russell to the block, and the horrible sentence of death for high treason was forthwith pronounced. The king and the duke were determined to have his blood, and to crush the leaders of the whig party. Some of the Tory ministry ventured to plead in his favor, but in vain. The earl of Bedford had gained the king's favorite, the duchess of Portsmouth, to his interest, and offered, through her, £100,000 for the life of his son. To satisfy his aged father, and at the earnest request of his afflicted wife, Russell himself petitioned the king. He solemnly disclaimed the least intention against the king's life, or the least design to change the constitution. There is reason to believe that Charles was disposed to relent, but that the duke of York insisted upon the prisoner's death, which took place July 21, 1683. The simple relation of his last hours by bishop Burnet, his intimate friend and companion, is justly considered one of the most pathetic passages in history. The murder of Russell, perpetrated for the most unconstitutional end by the most unconstitutional means, followed by that of Sidney, rendered the despotism of the Stuarts odious, and led, in the next reign, to the overthrow of the family. Russell died in the 42d year of his age, leaving a name to be remembered and revered wherever truth has a sanctuary or liberty a shrine. His attainder was annulled after the revolution. His widow, LADY RACHEL WRIOTHESLEY, second daughter and heiress of Thomas earl of Southampton, survived her lord more than forty years. She cherished the memory of her lord with the most tender recollections. She died Sept. 29, 1723, at the advanced age of 86. Her eldest son by lord Russell was WRIOTHESLEY, second duke of Bedford.

JOHN, fourth duke, was first lord of the admiralty in the Pelham administration of 1744. He became in 1756 lord-lieut. of Ireland. In 1762 he was accredited minister plenipotentiary to the court of France, and signed at Fontainebleau the preliminaries of peace with France and Spain. He was president of the council in the administration formed by Mr. Grenville in the autumn of 1763. His concern with public affairs extended over the important term comprised between the fall of the administrations of Walpole and Chatham. When first lord of the admiralty (from 1744 to 1748), he shared with Mr. Pelham, the premier, and the duke of Newcastle, the substantial power of the government. His correspondence, preserved at Woburn Abbey, and given to the world by earl Russell, contains authentic materials for the illustration of the political history of England from 1744 to 1770. The introduction to the first volume contains a brief but able historical sketch by the noble editor of the period from the administration of Walpole to 1748, and some interesting particulars of the private life and personal character of the duke. He died in 1771, and was succeeded by his grandson—

FRANCIS, fifth duke, born in 1765. He was a steady friend to the cause of popular freedom, and was regarded by his friends, among the most devoted of whom was Charles James Fox, with feelings of attachment amounting to enthusiasm. He died unmarried in 1802, and was succeeded by his brother—

JOHN, sixth duke, born 1766, father of lord John (now earl) Russell (q.v.). He died Oct. 20, 1839, and was succeeded by his eldest son—

FRANCIS, seventh duke, who, after a short career in the lower house, was summoned to the house of lords in his father's barony of Howland. He declined office, but invariably supported the views and measures of the whig governments, and in the dissensions among the whig party the political congresses at Woburn exercised great influence. He was much consulted by his distinguished brother, when first lord of the treasury, and on more than one occasion his advice on political affairs was sought by his sovereign. He was an enthusiastic patron of the turf from early life, and his stud at Newmarket was of princely dimensions. Of late years he devoted himself to the happiness of his tenantry and the comfort of the laborers on his extensive estates. He died May 14, 1861, and was succeeded by his only son—

WILLIAM, eighth duke, born in 1809. He was M.P. for Tavistock from 1832 to 1841, but was most retired in his habits, and took no active part in political affairs. He died May 26, 1872, and was succeeded by his cousin—

FRANCIS, ninth duke, born 1819, eldest son of the late maj.-gen. lord George Russell, second son of John, sixth duke. The heir-apparent to the dukedom is his son George, marquis of Tavistock.

The dukes of Bedford have a magnificent mansion and park at Woburn, near Bedford.

RUSSELL, Benjamin, 1761–1845; b. Boston; apprenticed to Isaiah Thomas to learn the printer's trade, served as a soldier in the revolutionary war, and at the same time corresponded for the Worcester *Spy*, published by his late master. In 1784 he became a printer in Boston on his own account, and began the publication of a semi-weekly journal called *The Columbian Centinel*, assisted by Ames, Pickering, Lowell, Higginson, and Cabot as contributors, exerting a marked influence on the public opinion of the time, and retiring from the editorship in 1828. He was one of the aldermen of the city, representative to the general court, state senator for a number of years, one of the governor's council, and in 1820 a member of the constitutional convention.

RUSSELL, David Allen, 1820–64; b. Salem, N. Y.; son of David; graduated from West Point 1845; served in the Mexican war and in the war of the rebellion. He was in the hardest-fought battles of the war, and rose through successive grades to brig.gen.; was prominent in the battle of Fredericksburg, and in Grant's campaign from the Rapidan to the James; wounded at Rappahannock 1863. On the 2d day of the battle of the Wilderness he saved the 6th corps, and commanded the 1st division; was wounded at Cold Harbor, and transferred to the Shenandoah. He was brevetted lieut.col. for battles on the peninsula, col. and brig.gen. for Gettysburg and the Wilderness, maj.gen. for Opequan.

RUSSELL, John Russell, Earl, K.G., English minister and statesman, third son of the sixth duke of Bedford, was born in Hertford street, Mayfair, London, Aug. 18, 1792, educated at Westminster school, whence he was sent to Edinburgh, at that time preferred to the English universities by the great whig families. Here he pursued his studies with industry and success, under the care of prof. Dugald Stewart; and here, at the meetings of the speculative society, he first exercised his powers of debate. In 1809 he proceeded on a continental tour, and France being closed against English travelers, he directed his steps to Portugal and Spain. In 1821 appeared his *History of the British Constitution*, and in 1824, *Memoirs of the Affairs of Europe from the Peace of Utrecht*. In more recent years he compiled from the family archives and gave to the world the *Correspondence of John, fourth Duke of Bedford*, which throws much light on the secret history of the early part of George III.'s reign; the *Life, Diary, and Letters of Thomas Moore*, in pursuance of a promise made to the poet several years before; the *Correspondence of Charles James Fox*, and *Life and Times* of that great whig statesman. Having now noticed his career as an author, we may briefly pass in review his long, honorable, and consistent career as a politican. In 1813 he was elected for the family borough of Tavistock, and vigorously but vainly opposed the repeal of the *habeas corpus* act in 1817. He made his first motion in favor of parliamentary reform in 1819, and continued to bring the subject almost annually before the lower house, until he stood forward as a minister of the crown to propose the great measure of 1831. He was also the strenuous advocate of the repeal of the test and corporation acts, Roman Catholic emancipation, and other measures of civil and religious liberty. In 1828 he carried by a large majority his motion for the repeal of the test and corporation acts, although it was opposed by the duke of Wellington's government. In 1829 he supported the Catholic emancipation bill. At the general election of 1830, caused by the death of George IV., the rallying cry of parliamentary reform sent many additional liberals into the house of commons. The "great duke" was driven from office; and earl Grey being appointed prime minister, proceeded to form a cabinet pledged to peace, retrenchment, and reform. Russell did not receive a seat in the cabinet, but he was appointed to the lucrative office of paymaster of the forces, and was one of the four members of the government to whom earl Grey intrusted the task of framing the draft of the first reform bill. The great and imperishable honor next devolved upon Russell of proposing the bill (Mar. 1, 1831). The fortunes of the measure belong to the history of the time; suffice it to say, that on June 4, 1832, the bill obtained the royal assent, and that the country was saved from the throes of revolution and civil war, which at one period appeared imminent. Russell left office with the Melbourne government (which had succeeded to that of earl Grey) in Nov., 1834. In Mar., 1835, he brought forward a motion in favor of taking into consideration the temporalities of the Irish church. It was opposed by the government, but after three nights' debate, was carred by 322 votes against 289. On April 4 he carried a resolution in committee in favor of appropriating any surplus which might remain, after fully providing for the spiritual wants of the members of the Irish church, to the general education of all classes of Christians. The report of the committee having been affirmed by the whole house, the government of sir Robert Peel was dissolved, and that of lord Melbourne restored. Russell now became home secretary, with a seat in the cabinet. On June 5, 1835, he brought in an important bill for the reform of the municipalities of England and Wales, which was carried after some mutilation, and secured an effective reform of municipal institutions. Next session he proposed and carried the government plan for the commutation of tithes in England. Also a bill for a general registration of marriages, births, and deaths, the value of which, in social and statistical inquiries, can scarcely be overrated; and a bill for the amendment of the marriage laws, which enabled dissenters to be married in their own chapels. He likewise passed an English church reform bill, making a new distribution of episcopal dioceses and incomes. In 1837 he carried a series of bills for further amending the criminal law, by which capital punishment was finally removed from forgery and all offenses except seven. An Irish tithe bill was also passed, but the "appropriation clause" being always rejected by the lords, Russell was obliged to accept the bill divested of the clause. He exchanged the seals of the home for those of the colonial office, when the Canadians broke into rebellion in 1839, and sent over lord Durham, who recognized the right of the Canadians to self-government; and who, with his successor, lord Sydenham, brought the Canadas into loyal and harmonious relations with the mother-country, which have never since been disturbed.

In 1841 Russell proposed a fixed duty of 8s. per quarter on foreign corn, and a reduction of the duties on sugar and timber. Being defeated by the opposition, the Melbourne government appealed to the country without success; and Russell and his colleagues made way for the administration of Peel. In this general election, he challenged the verdict of the city of London upon the free-trade measures of the government, by boldly leaving Stroud, and standing for the city. He was elected by the narrow majority of nine votes, and continued to represent the city until his elevation to the peerage. In Nov., 1845, Russell wrote a letter from Edinburgh to the electors of the city of London, announcing his conversion to the total and immediate repeal of the corn laws. This letter led to the resignation of the Peel cabinet; and Russell was commissioned by the queen (Dec. 11, 1845) to form an administration, which at first he failed to do through the antipathy of earl Grey to lord Palmerston, and sir Robert Peel being recalled to power, had the honor of carrying the repeal of the corn-laws. His Irish coercion bill, however, being defeated by the combined whigs and protectionists, he resigned; and Russell became nominally what he had been really during the greater part of the Melbourne administration—prime minister. In 1846 a series of assassinations in Ireland compelled him to propose a more stringent coercion act than that of the previous session. In 1847 he had to deal with the Irish famine; and in 1848 with a miniature Irish rebellion. The papal bull, parceling England into dioceses, extorted from Russell an indignant protest, first in the form of a letter to the bishop of Durham, and next in the ecclesiastical titles bill of 1851, prohibiting the assumption of territorial titles by Roman Catholic prelates. Russell's advice to the queen to dismiss her foreign secretary and his ancient colleague, lord Palmerston, for communicating, without consultation with his colleagues, his approval of the French *coup d'état*, precipitated the downfall of the Russell administration, and in Feb., 1852, he ceased to be first lord of the treasury. Lord Derby made an unsuccessful attempt to carry on the government; and in the succeeding cabinet of the earl of Aberdeen, Russell consented, Dec., 1852, to fill the post of foreign secretary with the leadership of the house of commons. In the session of 1854 he brought forward a new reform bill, but was most reluctantly compelled to resign it in consequence of the Crimean war. He was next appointed commissioner to the congress of Vienna, and incurred so much unpopularity by recommending terms of peace, and a plan of counterpoise suggested by Austria, that he was forced by the pressure of unfavorable opinion to leave the ministry (July, 1855). He voted against the government on Mr. Cobden's motion against lord Palmerston's Chinese policy, which led to a dissolution. When the second administration of lord Palmerston was formed (June, 1859), Russell became for the second time foreign secretary, which office he held until 1865. He threw the moral influence of his name and the nation he represented into the scale of Italian unity and independence. He uttered warnings and remonstrances against the annexation of Savoy and Nice by France, which gave great offense to the government of the emperor Napoleon by their frankness and candor. He ably preserved British neutrality in the civil war between the federal and confederate states of America. He wrote spirited dispatches expressive of the indignation with which the British government regarded the despotic acts of Russia in Poland; but he incurred many reproaches from the Poles and their sympathizers in France and England, for withdrawing from the Austrian and French alliance when war with Russia appeared imminent. More recently, he took an active but not a successful part in the Slesvig-Holstein dispute, which the peculiar policy of the French emperor brought to nothing. Russell always took a very prominent part in promoting the education of the people, and, with the assistance of lord Lansdowne, laid the foundation of the present system of national education, supported by parliamentary grants, and administered by the committee of privy council for education. He brought forward for many years a measure admitting the Jews to parliament, which passed in 1858 upon a compromise suggested by the earl of Lucan. But the question with which he has ever been identified in the public mind is parliamentary reform. He brought in a reform bill in 1852, a second in 1854; moved the resolution which procured the condemnation of the Derby reform bill in 1859; and in 1860 brought in another government bill, which failed to pass. In 1861 he was called to the upper house, and exchanged the courtesy title of "lord John," by which he had been so long known, for that of earl Russell. On the death of lord Palmerston in 1865, earl Russell became prime minister for the second time. In 1866 he and Mr. Gladstone introduced a reform bill, which was rejected, and the ministry shortly thereafter resigned. Thenceforward, till near the time of his death, May 28, 1878, earl Russell remained an active but unofficial member of the liberal party in the house of lords. Though his voice was weak and his delivery affected, earl Russell was an admirable and successful debater; and his speeches sometimes rose to a high order of oratory. His indomitable self-reliance and tenacity of self-assertion were sarcastically painted by the rev. Sydney Smith, who called him the "Lycurgus of the lower house." Since the works mentioned above, earl Russell published his *Recollections and Suggestions* (1875), besides selections from his speeches and dispatches, and various addresses; and, in 1873, the veteran statesman entered fearlessly on a new field, and gave us his *Essays on the Rise and Progress of the Christian Religion in the West of Europe.*

RUSSELL, John Scott, b. Scotland, 1808; educated at the universities of Edinburgh, St. Andrews, and Glasgow. He studied engineering and became a practical ship-builder. Studying the laws of the resistance of water to floating bodies, he showed the existence of the so-called "wave of translation," upon which his "wave system" of ship-building is based. His claim to this discovery was disputed by the late Thomas Assheton Smith. Russell has built several vessels on this system, of which the *Great Eastern* is the best known. Among his more recent works are the great dome at Vienna, with a span of 360 ft. clear diameter, and his plan for carrying railway trains over sea in ships

RUSSELL, William, 1793–1873; b. Scotland; educated at the university of Glasgow; emigrated to America in 1817; was a teacher in Savannah. Ga., and in New Haven, Conn.; instructed classes in elocution in Andover, Cambridge, and Boston; edited the *American Journal of Education* 1826–29. Removing to Germantown, Penn., he taught a school for young ladies, and afterward had charge of similar institutions in Philadelphia, Andover, and Boston. In 1840 he established an institution for teachers in New Haven, which he removed to Lancaster, Mass., in 1853, where he long remained as director of the normal institute. He published many treatises on education, and text-books for schools, especially in reading and elocution.

RUSSELL, William Howard, ll.d., b. Ireland, 1821; educated at a private school in Dublin until 1838, when he entered Trinity college. He wrote for the London *Times* in 1841, and with such appreciation as to be attached to the parliamentary corps of that paper in 1843. He studied at the bar, entering the Middle temple in 1846, in which year he married. His first important expedition as a correspondent was in 1854, when he was sent by the *Times* to the seat of the Crimean war, in the description of which he established a high reputation for brilliancy of diction and graphic representation. He visited Moscow in 1856, and described in the columns of the *Times* the coronation of the emperor. In 1856 he was sent to India on the occasion of the mutiny, and was with lord Clyde from the capture of Lucknow until the close of the mutiny, serving in Rohilcund, Oude, etc., for which he received the war medal with Lucknow clasp. In 1858 he returned to England and established the *Army and Navy Gazette*, of which he continues editor and principal proprietor. In 1861 he was re-engaged by the *Times* as war-correspondent, and visited the United States in that capacity, but remained only until after the first battle of Bull Run. His account of that engagement rendered him obnoxious to the union leaders, and, being refused permission to accompany the army, his mission ended, and he returned to England. In 1866 he was present at the battles of Koniggrätz and Sadowa; and in 1870 at the battle of Sedan and the siege and fall of Paris. He chronicled for the *Times* the incidents of the visit of the prince of Wales to India, was a juror at the Paris exposition of 1878, and was nominated an officer of the legion of honor. He has been presented with the iron cross of Prussia, the war medal for 1870–71, the Turkish war medal for the Crimea, the order of the Medjidie (4th class), and other decorations; and in 1856 received the degree of ll.d. from the university of Dublin. He published *Letters from the Crimea; Diary in India; My Diary North and South;* and other works.

RUSSIA, Empire of, extending over a large proportion of the northern regions of the globe, includes the eastern part of Europe, the whole of northern Asia, and a part of central Asia. Lat. 38° 30′ to 78° n.; long. 17° 19′ e. to 190° e. (170° west). The portion of North America which formerly belonged to Russia was ceded to the United States in 1867. Russia is bounded on the n. by the Arctic ocean; on the e. by the Pacific ocean; on the s. by the Chinese empire, Turkestan, Caspian sea, Persia, Asiatic Turkey, and the Black sea; and on the w. by Roumania, Austria, Prussia the Baltic, and Sweden. The area of Russia amounts to more than 8,000,000 sq.m., and is more than double the entire area of Europe. The empire thus covers nearly $\frac{1}{26}$ of the surface of the globe, and more than $\frac{1}{7}$ of the land superficies of the planet. The population of this vast area was in 1870 estimated to amount to upward of 86,000,000. The following table does not take account of the territories acquired by Russia in 1878, Roumanian Bessarabia, and part of Turkish Armenia:

Name of Government.	Area in Eng. square miles.	Population in 1870.
1. Archangel	286,595	281,112
2. Astrakhan	84,969	601,514
3. Bessarabia	14,206	1,078,932
4. Courland	10,550	619,154
5. Don Army, Province of the	61,900	1,086,264
6. Ekaterinoslav	26,128	1,352,300
7. Esthonia	7,607	323,961
8. Grodno	14,952	1,008,521
9. Jaroslav	13,751	1,000,748
10. Kaluga.	11,870	996,252
11. Kazan	23,714	1,704,624
12. Kharkov	21,004	1,698,015
13. Kherson	27,455	1,596,809
14. Kiev	19,671	2,175,132
15. Kostroma	30,796	1,176,097
16. Kovno	15,679	1,156,041
17. Kursk	18,891	1,954,807
18. Livonia	17,793	1,000,876
19. Minsk	35,277	1,182,230
20. Mohilev	18,535	947,628
21. Moscow	12,847	1,772,624
22. Nijni-Novgorod	19,620	1,271,564
23. Novgorod	46,288	1,011,445
24. Olonetz	50,470	296,392
25. Orel	18,024	1,596,881
26. Orenburg	73,947	900,547
27. Penza	15,127	1,173,186
28. Perm	128,151	2,198,666
29. Podolsk	16,233	1,933,188
30. Poltava	19,225	2,102,614
31. Pskov	16,851	775,701
32. Riasan	16,240	1,477,433
33. St. Petersburg	17,056	1,325,471
34. Samara	64,953	1,837,081
35. Saratov	32,596	1,751,268
36. Simbirsk	19,098	1,205,881
37. Smolensk	21,536	1,140,015
38. Tambov	25,514	2,150,971
39. Taurida	23,596	701,997
40. Tchernigov	20,238	1,659.600
41. Toula	11,940	1,167,878
42. Tver	25,731	1,528,881
43. Ufa	46,989	1,364,925
44. Viatka	59,143	2,406,024
45. Vilna	16,398	1,001,909
46. Vitebsk	17,425	888,727
47. Vladimir	18,797	1,259,923
48. Volhynia	27,709	1,704,018
49. Vologda	154,971	1,003,039
50. Voronej	25,427	2,152,696
The 50 Governments	1,823,828	65,704,559
The Russian Lakes and Nova Zemla	53,085	....
The 10 Polish Governments *	47,090	6,026,421
Grand Duchy of Finland	134,761	†1,832,622
Caucasus	169,541	‡4,893,332
Siberia	4,715,630	3,405,084
Central Asia	1,320,765	4,650,213
Russian Empire	8,264,200	86,586,000

The Russian Sea-board.—The northern shores of the Russian territories, which are washed by the Arctic ocean, are deeply indented. The White sea (q.v.), an immense arm of the Arctic ocean, penetrates 350 miles into the main-land, and is subdivided into the gulfs of Onega and Archangel or Dwina. The other chief inlets on the n. of Russia are the Kara Sea and the gulfs of Obi and Yenisei. Westward from Nova Zemla (usually, but less correctly, spelled Zembla), the Arctic ocean is navigable for three months of the year; e. from that island, the sea, even at the mildest season, is encumbered with floating icebergs. The chief islands in this ocean are the Kolguef, Waigatz, Nova Zemla, and Spitzbergen isles. The eastern shores of Russia are washed by the Pacific, subdivided into the Behring, Okhotsk, and Japan seas; and the islands belonging to this country in these seas are Sakhalin, and the northern part of the Kuriles. On the s. are the Black sea (q.v.), and the sea of Azov (q.v.), the latter communicating with the former by the strait of Kertch, and so shallow that it is navigable for small craft only. Of the Caspian sea, Russia commands the whole, with the exception of the

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* Incorporated with Russia in 1868. † In 1874. ‡ In 1871.

s. shore, which belongs to Persia. The northern and eastern banks of the Caspian are the seats of the chief fisheries of the empire. On the n.w. of Russia is the Baltic sea, with the gulfs of Riga, Finland, and Bothnia; and in these waters the islands of Aland, Esel, and Dago belong to the empire. The freezing of the water near the shores of the Baltic renders the navigation of this sea impracticable during five months of the year, although a few ports are accessible throughout the whole year. Possessing means of easy communication with the most fertile governments of the interior, and sustaining chiefly the commerce of the Russian empire with the other parts of Europe and with America, the Baltic is of the highest commercial importance.

Surface, Hydrography, and Soil.—European Russia consists of a vast plain bordered with mountains. On the e. are the Ural mountains (q.v.), forming a broad range of no great elevation, ending on the n. on the shores of the Arctic ocean, and on the s. in a range of elevated plains on the left bank of the Volga. On the s.e. of the great plain is the lofty range of the Caucasus (q.v.), crossed by the pass of Derbend and the so-called military Georgian road. The Crimean mountains, a continuation of the Caucasian chain, rise to 5,000 ft. in their highest summit. The districts in the s.w. of Russia, between the Vistula and the Pruth, are covered by hilly ranges from the Carpathian mountains (q.v.) which in Poland are known as the Sandomir mountains. The Finland mountains, on the n.w. are ranges of granite rocks, embracing numerous lakes, and not rising higher than 600 feet. The Alaunsky table-land, which connects itself with the Ural mountains by a chain of hills in lat. about 62° n., is the key to the configuration of European Russia. From this table-land, with an elevation of about 1200 ft., the country, with gradually declining slopes, falls away in four directions—n. to the Arctic, n.w. to the Baltic, s. to the Black, and s.e. to the Caspian seas. The sloping country on the n. of the Alaunsky heights is called, from its eastern and western limits, the Ural-Baltic table-land; that on the s. of the same dividing heights is called, for the same reason, the Ural-Carpathian table-land. The Alaunsky heights form the great water-shed, and regulate the course of all the great rivers of the Russian empire. To the n. they throw off the Petchora, the northern Dwina, and the Onega; to the s., the Dniester, Bug, Dnieper, Don, and Kouban; to the s.e., the Volga, with its great affluents the Oka and Kama. The western Dwina, the Niemen, and the Vistula fall into the Baltic sea. The important rivers of Russia receive separate notice under their own names. At the foot of the n.w. slope from the central terrace is the lake-country of European Russia, and the great lakes (which are noticed separately) are Ladoga, Onega, Ilmen, Peipus, and Pskov, The plain of European Russia naturally divides itself into three tracts or zones, each of which differs from the others in the nature and quality of its soil. The northern zone extends between the Arctic ocean and the Ural-Baltic table-land, the middle zone between the Ural-Baltic and the Ural-Carpathian table-lands, and the southern zone between the Ural-Carpathian table-land and the Black and Caspian seas. The soil of the northern zone is marshy, and the climate inclement. In its middle part, between the rivers Onega and Mezen, and especially along the banks of the northern Dwina, forests of fir-wood and large tracts of fodder-grass occur. Toward the e. of this tract the woods disappear, and vast marshes, frozen the greater part of the year, cover the country. The middle zone reaches s.w. to the government of Volhynia and the s. of Poland, and n.e. to the Ural mountains. In the w. it consists of an extensive hollow, covered with woods and with marshes, the chief of which are those of Pinsk (q.v.). In the middle part of this zone the soil is partly heavy and covered with mold, and toward the n., sandy. Beyond the Oka, luxuriant meadows abound; and on the e., beyond the Volga, this tract forms an extensive valley, covered with a thick layer of mold, abounding in woods, and rising into hills in the vicinity of the Ural range. The southern zone consists of steppes extending alone the shores of the Black and Caspian seas. The steppes of the Black sea have mostly a moldy soil, covered with grass; but in the s.e., shifting sands and salt marshes predominate. The steppes of the Caspian consist of sand, salt marshes, and salt lakes—the Elton lake, yielding nearly 4,000,000 puds (about 1,290,000 hundred-weights) of salt annually, being the most remarkable.

Constitution and Administration.—The government is an unlimited monarchy, the head of which is the emperor, who unites in himself every authority and power—that is to say, is the head of the military, the legislative, and the judicial systems, and is also the ecclesiastical chief of the orthodox Greek church. The order of succession is by primogeniture, hereditary in heirs-male, and in females in default of males. The expenses of the imperial house amount to about £1,500,000 annually; the private property of the imperial family, yielding about £1,000,000 annually, is excluded from the budget. Every military or civil officer of the crown is required to take an oath of allegiance. The council of state is the highest branch of the executive, and comprehends the legislative, judicial, and administrative powers. The president and members—among whom are always included the ministers of the crown—are appointed by the emperor. A secretary of state, whose duty it is to report the opinion of the council to the emperor, is attached to this body. The estimates of expenditure and income, and every proposition introducing an addition to, or a modification of, the laws, is considered and revised by this council, which for the more orderly discharge of its functions, is divided into three sections: 1. Law; 2. Civil and ecclesiastical; 3. Economy and finance. The main function of the council is that of superintending the general administration, of watching over the execution of the laws of the realm, and of proposing alterations of the same when necessary. The second of the great boards of government is the senate, whose functions are partly deliberative and partly executive. It is the high court of justice for the empire, controlling all the inferior tribunals; and besides its legal duties, it examines into the state of the public revenue and expenditure. The senate is divided into seven committees or departments, of which five sit at St. Petersburg and two at Moscow. The third college is the holy synod, superintending the religious affairs of the empire. Its decisions have no force till approved by the emperor. The fourth great board of government is the committee of ministers, the highest administrative body. It is divided into nine departments, which have under their management the court; foreign affairs; war; the navy; the interior; public instruction; finances; crown domains; public works; and has besides a general board of control. All of these great boards center in the private cabinet of the empire. Except the departments of foreign affairs and the imperial court, all these branches of the central administration are represented in the provinces. European Russia is divided into 50 provinces, over each of which is a governor, appointed by the emperor, and who is the head of the civil administration of the province or government. Some provinces, although administered by governors, are united under the superintendence of a governor-general. This arrangement is rendered necessary owing to the immense extent of the empire, and the governor-generalships are generally remote frontier regions. Of late years (especially since 1862), reforms have been effected throughout all the various branches of the government. Reforms in the municipal and rural administration of the provinces have given increase of self-government. A new legal system, including oral testimony, trial by jury, and publicity of courts, was introduced in 1864. By the Russian law, capital punishments are only inflicted for high-treason. The severest punishments inflicted for violations of the law (see KNOUT) are labor in the galleys, in the public works, deportation to the mines of Siberia, etc. The audacity of the revolutionary party known as nihilists (see NIHILISM) has caused of late increased rigor and frequency of political punishment. Repeated and fatal attempts on the life of high-placed officials, and the acquittal by a jury of one of the most notable assassins, led in 1878 to the withdrawal of trials for political offenses from juries; such trials are now conducted by court-martial.

Distinctive Rank of Classes.—The nobility occupy the highest place in the social scale, enjoy many special privileges, such as freedom from poll-tax, and form in every province a separate body, headed by a marshal, chosen by and from themselves. Till 1871 they were also free from the conscription. Functionaries, officials, artists, and clergy possess almost as many privileges as the nobility. In 1868 a most important measure was passed, by which the clerical character was declared to be no longer hereditary, and the sons of the secular clergy, hitherto bound to some ecclesiastic or monastic service, were set free to choose their own career. The next class is that of the merchants. The burghers and peasants constitute the lowest class, and are subject to claims of service and to personal taxation. Each class enjoys, to a certain extent, the right of self-administration in its own affairs. Each apportions its taxes, and chooses some of its own functionaries. The recent emancipation gave freedom to 20,000,000 peasants or serfs who, prior to the year 1861, being governed exclusively by their owners, enjoyed very limited civil rights. Communal government is the fundamental principle of all the rights of the peasant class. In general, the lands allotted to the peasants are not their individual property, but belong to the commune, and are shared among all its members.

National Debt.—The national debt must be regarded as divided into two parts, one of which represents the loans made abroad, and the other the loans made at home. Its total amount was given in 1878 at £350,000,000, about half of which was contracted abroad. Several recent loans have been raised in order to tide over the terrible financial stress produced by the late war with Turkey, the expenditure for which has been officially stated (greatly understated, it is believed) at £130,000,000.

Revenue and Expenditure.—The following table shows the amount and the details of the revenue and expenditure for the year 1872:

REVENUE.

1.	Direct taxes (including Poll-tax)............................	£14,887,697
2.	Indirect taxes (including those derived from spirits, salt, tobacco, beet-sugar, customs, and stamps).............	34,118,423
3.	State monopolies (drawn from mines, money, post-office, telegraphs)..	2.957.611
4.	State domains..	5,458,083
5.	Miscellaneous receipts..	6,327,174
6.	Revenue of the trans-Caucasus................................	750.782
7.	"Recettes d'ordre"...	2,690.842
8.	Extraordinary receipts..	948,674
	Total..	£68,139,285

EXPENDITURE.

1.	Public debt	£11,833,092
2.	Superior institutions of the state	244,842
3.	Holy synod	1,288,483
4.	Ministry of the imperial household	1,226,581
5.	" foreign affairs	343,226
6	" war	21,452,618
7.	" marine	2,845,105
8.	" finances	10,623,946
9.	" imperial domains	1,318,404
10.	" interior	5,821,457
11.	" public instruction	1,541,863
12.	" public works	3,072,158
13.	" justice	1,449,859
14.	Audit of the empire	274,063
15.	General direction of studs	94,880
16.	Expense of Poland for administration of justice	111,222
17.	Civil government of the trans-caucasus	769,955
18.	"Non valeurs"	136,986
19.	"Dépenses d'ordre"	2,664,150
20.	Extraordinary expenses	948,674
	Total	£68,053,509

The total revenue for 1876 was over £76,900,000, and the expenditure £78,775,000, leaving a deficit of more than £1,800,000.

Army.—Although a small permanent force was in existence from very early times, a standing army was first instituted in Russia toward the close of the 17th c. by Peter the great. Before that time, military levies were raised for longer or shorter periods, to suit the exigencies of the moment. Till lately the army was raised by conscription under an imperial ukase; but in 1870 an imperial ukase announced the principle of universal liability to military service, and another in 1874 reorganized the entire military system. There is an annual conscription to which all men who have completed their 21st year, and are not physically incapacitated, are liable. Substitution is prohibited. The period of service in the army is 15 years, six in active service, and nine in the army of reserve. During the latter period, the soldier is liable to service only in time of war. To enable the educated classes to free themselves from compulsory conscription, young men sufficiently educated may enter on a short period of service from their 17th year. On Jan. 1, 1863, the standing army, including the guard, consisted of 31,110 generals, staff, and commissioned officers, and 818,105 privates and non-commissioned officers. This force was divided into 608 battalions of infantry, 313 squadrons of cavalry, and 182 batteries of artillery. Besides this establishment, there were 300,000 irregular troops, consisting of Cossacks, Kirghiz, Circassians, and other contingents, who are liable to military service in lieu of paying taxes. The law of 1874 thoroughly remodeled the whole military organization of the Cossacks, who now form in time of peace a perfectly organized body of men, easily attached to the cavalry division in time of war. In peace they have 21 regiments and 8 horse-batteries, increased in war to 62 and 22 respectively. The grand-duchy of Finland has a military system of its own. The Russian army, on the peace footing, consisted, in 1879, of about 770,000 men, of whom about 470,000 belonged to the regular army, and 300,000 to the reserve. In time of war the number can be raised to 1,500,000. (For further details see ARMIES, MODERN.) The expenditure for the army, as set down in the estimates for 1876, was £25,752,430.

Navy.—The Russian boundaries were first advanced to the sea under Peter the great, and from the genius of that monarch the Russian navy sprang. Besides the naval depôts on the Baltic, the Black, and the Caspian seas, there are also naval establishments on the shores of the North Pacific and on the Amur. In 1875 Russia had 137 war-vessels in the Baltic sea, 31 in the Black sea, and 55 on other waters. In all, there were 223 ships with an aggregate burden of 190,000 tons, 29 being iron-clads. The expenditure for the navy was in 1876 estimated at £3,576,900.

Religion and Churches.—Toleration of all religions which do not violate public morality or good order, exists in Russia, and not to profess the orthodox Greek faith, the national religion, does not disqualify for the enjoyment of any civil rights. The law does not allow those who already belong to the established faith to secede from it; and if, in a household, either of the parents be a member of the Greek church, all the children must be brought up within that communion. The emperor is head of the church, the affairs of which he directs by means of a synod composed of the chief prelates, who are summoned from their dioceses to attend its meetings (see RUSSIAN CHURCH). The direction and regulation of all other religious communities emanates from a department in the offices of the minister of the interior. In 1871 there were in European Russia, exclusive of Finland and Poland, 53,139,247 orthodox Greeks; 922,079 Raskolniks; 37,136 Gregorian Armenians; 2,882,991 Roman Catholics; 2,234,112 Protestants; 1,829,100 Jews;

2,358,766 Mohammedans; and 255,508 heathens. In 1861 there were 614 orthodox convents, 137 of which were occupied by women. There were 5,648 monks, and 4,879 lay-brothers; 2,931 nuns, and 7,669 lay-sisters; 50,394 priests and deacons, and 63,421 other persons, who were employed in religious services in the 50,165 orthodox churches. For the education of the clergy, there are 4 academies, 50 seminaries, and 201 schools, in which 54,000 persons are trained. The churches, convents, and the ecclesiastical departments in general, are maintained by government.

Public Instruction.—The department of public instruction in Russia is presided over by a ministry, although many of the schools are directed by other departments. The greater number of these establishments are supported out of the imperial treasury. Russia in Europe, excepting Finland, is divided into nine educational districts—namely, St. Petersburg, Moscow, Dorpat, Kiev, Kharkov, Kazan, Odessa, Wilna, and Warsaw—each, Wilna accepted, having a university. Of the students—who do not reside within the universities—the poorest are allowed stipends for their maintenance, and the candidates for admission as students must have passed satisfactory examinations in the courses of instruction gone through at the gymnasia. Degrees are conferred in law, medicine, philology, mathematics, natural history, and the oriental languages. Degrees in theology are granted at Dorpat to students of the Lutheran faith. The professors are appointed and paid by the government. Four institutions, the law school and lyceums of St. Petersburg, Nijni, and Jaroslav, are specially devoted to legal science. The gymnasia, schools of the second class, about 130 in number, are found in the provincial towns. Besides the universities and gymnasia, there are numerous district schools; but the means of instruction, though rapidly increasing, are very insufficient. In 1853 there were only 8,000 village schools; in 1863 the number had enormously increased. There are also numerous special schools for instruction in mining, in wood-craft, civil engineering, navigation, etc. The military schools form a separate system. The cadets are transferred from the military gymnasia to the "military schools," in which they qualify to fill the posts of commissioned officers. Three academies, for the staff, the engineers, and the artillery, are devoted to the higher branches of military science. Theological education for the orthodox church is superintended by the clergy. According to the report of the minister of public instruction, there were in 1875, in the nine educational districts, 20,376 primary schools, attended by 670,186 boys and 169,379 girls.

Literary and Scientific Institutions, Museums, Press, etc.—Many of the most important institutions in Russia, as the academy of sciences and the Pulkova observatory, flourish in or near St. Petersburg (q.v.). There are, however, throughout the empire numerous institutions and societies for the promotion of the arts and sciences. The imperial library at St. Petersburg, with upward of a million volumes, is one of the finest in the world. The press of Russia, not yet much developed, is subject to special censorship, which, though rigorously exercised under the reign of Nicholas I., is now, under the milder government of Alexander II., considerably less strict. Each year gives evident proof of the rapidly increasing taste for literature and mental culture in Russia. In 1863 there were published within Russia and in the Russian tongue 1652 volumes. In the years 1873 and 1874, 5,206 books were published in Russia, of which 447 were translations from other languages.

Charitable Institutions are for the most part supported by government; and although their number is increasing annually, the scarcity of large national institutions—especially public hospitals—is painfully felt. Medical assistance can only be obtained in the provinces with the greatest difficulty, owing to the distances of the towns and the sparseness of the population. The foundling hospitals of St. Petersburg and Moscow receive annually about 15,000 abandoned infants and orphans.

Public Roads, Railways, and Canals.—Good roads and ready means of communication are a great want in Russia, where the distances are so great, and the population so scanty. To keep the roads in repair is a work of the greatest difficulty here, for two reasons—the first, a difficulty in concentrating a sufficient amount of labor where the laborers are so few and so widely dispersed; and the other, the melting of the snows and overflowing of the rivers in spring. During four or five months of the year the soil is thickly covered with snow, which, when it becomes hardened by the frost, offers an excellent, an easy, and a universal means of transit. On the return of mild weather, however, the snow melting, sinks into and softens the earth, which is also overflowed by the rivers. The roads being thus flooded are rendered almost wholly impassable for traffic till the soil dries. In autumn the usual rains fall, and the earth is again soaked, so that the time for easy communication during the summer is very short. In 1856 only 784 m. of railway had been opened, though a large extent was being constructed; but in Jan., 1877, the mileage in operation had risen to 13,000, while upward of 1300 m. were being constructed. Several of the chief cities of the empire are connected by means of macadamized causeways, which are now generally kept in good repair. The other towns are connected by ordinary track-roads, which are generally impracticable in spring and autumn. Owing to the generally bad character of the surface, and to the abundance of the rivers which traverse it, the water-communications of this empire are very important as commercial highways, though the vast transit-trade of the country is not confined to them alone. The transport of merchandise across the broad expanse of the empire is much facilitated by canals, which have here become an important and a pecullar institution. The four seas surrounding European Russia are connected by canals: 1. The Caspian is connected with the White sea by the canal of the Prince of Wirtemberg, between the river Scheksna, an affluent of the Volga, and the upper waters of the northern Dwina. 2. The Caspian and Baltic are connected by three systems of canals. See VOLGA. 3. The Black sea is connected with the Baltic by three lines of canals—those of Beresina, Oginsky and Dnieper, and Bug, between the affluents of the Dnieper and those of the western Dwina, Niemen and Vistula.

Postal Service.—This service was inaugurated in 1664. In 1875 there were forwarded 63,244,156 letters, 1,419,094 post-cards, 42,776,220 newspapers and stamped periodicals, and other packets, amounting in all to 121,517,735. The number of offices was 3,678 in 1877.

Electric Telegraph.—Notwithstanding the immense extent of the surface of Russia, and the distance from each other of its principal towns, these are now nearly all united by lines of electric telegraph. In Jan., 1875, upward of 40,000 m. of telegraphs had been laid by the Russian government, and 13,000 m. by private companies. In the end of Nov., 1871, the telegraph line through Siberia, connecting St. Petersburg with China and Japan, was finished, and a telegram forwarded from Nagasaki to the Russian capital. In 1874 there were sent 2,920,071 telegraphic messages to places within Russia, 365,000 to places abroad, and 209,194 official dispatches.

Population.—The population of the empire is spread with great irregularity over the surface. In European Russia its average is less than 37 per Eng. sq.m.; in the Caucasus, more than 28; in Siberia, ¼; in Poland, 112; and in Finland, 14 per Eng. sq. mile. These figures, however, cannot be taken as a correct illustration of the actual distribution of the masses over the enormous surface of the country; for, upon comparison, the degree of the density of the population of European Russia is found to vary greatly in the different governments. The government of Moscow contains 166 inhabitants per Eng. sq.m.; while that of Archangel contains only ¼. The central and s.w. governments of this part of the empire are the most densely peopled. The town residents are 9½ per cent of the whole population of European Russia; 7¼ per cent of that of the Caucasus; and 5 per cent of that of Siberia. Russian society is divided into five classes, and of these the nobility forms 1.49 per cent; the clergy (including their families) 1.01 per cent; the burgesses (*tiers état*) 8.60, the peasants, 82.55; and the military, 6.35 per cent. Irrespective of Asiatic and American Russia, we find that in Europe this empire comprises a greater variety of races than any other European state. It is not, however, like Austria, a composite community, speaking various idioms, and having different physical characteristics and political interests. In European Russia the predominant race is the Slavonian, and the Russian "element" and language prevail almost universally. The 50,500,000 Russians who inhabit Europe are divisible into—1. Great Russians (33,935,000), inhabiting central Russia. 2. Little Russians (12,015,000), located in the s.w. To the latter may be added the Cossacks (1,600,000), who are spread along the rivers Don, Kouban, Terek, Ural, Tobol, the lake of Baikal, and the Amur. 3. White Russians (2,950,000), in the western provinces. The other Slavonic races are Poles (4,640,000), in the kingdom of Poland, and partly in the w. provinces (where they form only 10⅔ per cent of the population); Servians and Bulgarians in Bessarabia and New Russia. The Finnish race (3,800,000), which occupies, under different names, the n. and n.e. of European Russia, and the n.w. of Siberia, has in great part adopted Russian language and manners. The Lithuanians and Letts (2,460,000) dwell mostly between the Niemen and Dwina. The Turkish Tartarian race (5,700,000), in the s.e., and partly in Siberia, comprises Tchuvashes, Tartars of Kazan, Kirghiz, etc. The Mongols (376,000), comprising Kalmucks and other races in the s.e. of European Russia and in the e. of Siberia. Besides these races there are Romains and Wallachs (770,000), in Bessarabia and New Russia; Persians, Kurds, Armenians, etc. (460,000), near the Caspian sea; Germans (920,000), distributed over the whole empire, but found in the greatest numbers in the Baltic provinces; Swedes (200,000), in Finland; Greeks (52,000), in the s.; Bohemians—i.e., Gypsies (50,000)—chiefly in Bessarabia; Jews (2,014,000), mostly in Poland and the w. provinces; Caucasians (1,830,000), Samoieds in the n. of Russia, and many other tribes in e. Siberia and Russian America.

Climate.—Owing to its vast extent, the Russian empire presents great varieties of climate. At Archangel the mean temperature of the year is 32° Fahr.; at Yalta, in the Crimea, 52°; and at Kutais, in the Caucasus, 58°. Consisting of an immense area of dry land, the climate of the empire is essentially continental; and the climate of localities in its interior is much more rigorous than that of places on the western shores of Europe in the same latitude. The mean temperature of Edinburgh and Christiana is higher than that of Moscow and Kazan. The rigor of the climate of the empire increases not only with the latitude, but as you advance eastward; thus, the mean winter temperature of the town of Abo, on the gulf of Bothnia, is the same as that of Astrakhan—viz., 23° Fahr.; although the former is in lat. 61°, and the other in lat. 47°, or 14° nearer the equator. The difference of the mean summer temperature under the same latitude is, on the contrary, not very considerable. The isothermal line of Astrakhan (60° Fahr.) passes through Lublin in Poland and Ekaterinoslav. In the e. the maximum heat is even greater than in the w.; and such heat-loving plants as the watermelon are grown more successfully in the s.e. of Russia than in the w. of Europe, under the same latitude.

The dryness of the atmosphere increases in the direction from n.w. to s.e. On the banks of the Baltic the average number of rainy and snowy days is 150, and the annual rainfall is 20 in., while near the Caspian the number of such days is 70, and the rainfall only 4 inches. The climate of Russia is in general healthy; but there are several places where diseases seem to be localized, as the shores of the Frozen ocean, where scurvy is common, the marshes along the Niemen and Vistula, where the plica polonica (q.v.) is the chief disease, and the marshy lands on the Black, Azof, and Caspian seas, where ague always prevails.

Manufactures.—Manufacturing industry in Russia may be said to date from the reign of Peter the great. With a view to its promotion, foreign manufactured goods are heavily taxed on importation. In 1870 the number of factories (exclusive of iron-works and all establishments engaged in the preparation of metals) was 19,431, which employed 410,225 hands, and produced articles amounting to 373,000,000 rubles. Of these factories, a half were in the governments of St. Petersburg, Moscow, and Vladimir. The metallurgical works are mostly in the government of Perm, and in other eastern governments bordering on the Ural mountains. Small handicraft manufacturing establishments abound in all the central governments, especially in the neighborhood of Moscow, where whole villages during the winter season are employed in some special industry, as weaving, tanning, fur-dressing, joiners' work, shoemaking, etc. The chief manufacture is spinning and weaving flax and hemp. Linen is manufactured to the value of 100,000,000 rubles, chiefly in hand-looms; although the finer qualities are manufactured by power-looms, mostly in the government of Jaroslav and Kostroma, and the capitals. Hemp is manufactured into sail-cloth and ropes, which articles are largely exported. Woolen and worsted stuffs are made to the value of 50,000,000 rubles, and the quantity is on the increase. Fine cloths and mixed fabrics are made in the capitals, and in the governments of Livonia and Tchernigov. Silk-spinning and weaving are carried on in the factories of Moscow, which is renowned for its brocades, and gold and siver embroideries. Through the influence of the protective system, cotton spinning and weaving have been of late very rapidly extended. In 1860 there were 158 cotton spinning mills, producing goods to the value of 58,350,000 rubles; and weaving establishments to the value of 13,000,000 rubles. After weaving, the next most important branch of industry is tanning, the products of which amount to 20,000,000 rubles. The other important branches of industry are cutlery, made in the town of Tula, the Russian Sheffield, and in the governments of Nijni-Novgorod, Vladimir, and Kostroma; and pottery and glass works, the former carried on in the government of Moscow, the latter in that of Vladimir. The produce of the machine factories in 1870 did not exceed 15,000,000 rubles; of the sugar refineries, 27,250,000 rubles; of the paper-mills, 5,750,000 rubles.

Commerce.—The Russian empire, including provinces varying widely in their natural and industrial resources, presents an extensive field for internal commerce, while the abundance of its products maintains a vast foreign trade. Of the former, which is by far the more important, the extent and value cannot be given, owing to the want of statistical data. Moscow, in the center of the industrial provinces of the empire, and the great depot for the wares that supply the trades of the interior, is the chief seat of the home-trade. The other large trading towns are chiefly those on the banks of the great rivers. The goods yearly conveyed by the Volga alone amount 200,000,000 rubles. Owing to the distances between the great trading towns, fairs are still of great importance in Russia. The transactions of all the fairs in the empire amount to more than 300,000,000 rubles, and the chief are those of Nijni-Novgorod (q.v.), Irbit (q.v.), Kharkov (q.v.), Poltava (q.v.), and Kursk (q.v.).—The foreign trade consists mainly of the export of raw products, and the imports of colonial and manufactured goods. The foreign trade by sea is five times greater than the trade by land; and of the latter, the commercial transactions with Europe amount in value to ten times the Asiatic trade. One-third of the whole foreign commerce is transacted at St. Petersburg, one-ninth at Odessa, and one-fifteenth at Riga. In 1875 the number of vessels that entered the ports of Russia were 13,527, and of these 2,475 were Russian, 2,339 English, 1652 German, 1471 Swedish and Norwegian, 762 Italian, 684 Dutch, and 1896 Turkish, etc. The following table gives the value of the chief articles of export for the years 1870 and 1871:

EXPORTS.	1870.	1871.
	In Thousands of Rubles.	
Cereals	162,990	182.948
Flax	57,098	49.583
Linseed	27,142	28.743
Hemp	11,005	12.234
Tow	2,827	2,324
Tallow	6,650	4.660
Wool	7,868	7,626
Cattle	7,217	6.358
Bristles	8,611	9.861
Hides	2,266	1,833
Wood	13,146	14,026
Oil seeds	1,566	8,420

The chief articles of import are sugar, tea, and coffee, cotton, cotton-yarn, raw silk, iron, (cast and wrought), wine and other liquors, dyes, fruit and vegetables, machinery; cotton, silk, woolen, and linen stuffs. The total exports amounted in value in 1861 to 163,721,683 rubles; in 1875, to 381.592,000 rubles. The imports were in 1861 valued at 144,971.791; in 1875, at 531,056,000. So that during these fifteen years the trade of Russia with foreign countries has increased to about threefold. The Russian exports to England are greater than those to any other foreign country; while Russia imports most extensively from Germany. In 1875 imports from Germany amounted to 221,442,000 rubles; from England, to 133,704,000. The commercial marine of Russia is at yet not much developed. At the end of 1874 it comprised 2,512 sea-going vessels, of an aggregate burden of 260,504 lasts, or 521,008 tons, besides 385 trading steamers on rivers and lakes.

Geology and Mineral Products.—A more intimate knowledge of the geological structure of Russia may be said to date from 1841, when the eminent geologist, sir R. I. Murchison, undertook a scientific journey to Russia and the Ural mountains. His geological investigations, together with the paleontological researches of his colleagues, E. de Verneuil and count Kayserling, have served as a basis for further surveys. The oldest stratified rocks are the Silurian, on the southern shores of the gulf of Finland, sinking down below the Devonian strata, which run in two large branches—on the s.e. to Voronesh, and on the n.w. to Archangel, both overlaid to the e. by a still more extensive deposit of carboniferous rocks. The immense triangle between those layers and the Ural is occupied by the Permian system (except the n.e. extremity, which is covered by Jurassic beds), named by sir R. I. Murchison from its development in the government of Perm. To the s. of the s.e. Devonian branch extend deposits of the cretaceous period, and detached patches of the carboniferous formation. The latter contains, in Russia, only the older members of the group up to the mountain limestone, which contains numerous but thin seams of coal, generally poor in quality. The field along the Donetz forms an exception, and yields annually about 96,400 tons ($\frac{3}{7}$ of the total quantity raised in Russia) of good coal and anthracite. The remaining s.w. and s.e. parts of the empire are covered by tertiary beds, more or less recent. The Ural mountains present an outcrop of all the secondary and paleozoic formations down to the stratified gneiss and granite, which latter composes nearly the whole province of Finland, and skirts the middle course of the Dnieper. The Ural mountains (q.v.), which contain almost all the mineral riches of the country, are the principal seat of mining and metallurgic industry. They produce gold, platinum, copper, and iron of excellent quality, especially the last, which is manufactured from magnetic ore. Emeralds and jaspers, etc., are also found, as well as diamonds of an inferior quality. Gold, silver, copper, plumbago, etc., are also obtained from the Altai and Nerchinsk mines in Siberia (q.v.). In 1863 the whole produce of the mines amounted to £12,000 000; and of this large amount the chief items were pure gold, 1460 puds (pud = 40 Russian pounds = 36 lbs. avoir.); silver, 968 puds; platinum, 31 puds; copper, 294,169 puds; lead, 150,000 puds; cast-iron, 18,404,500 puds —out of which were manufactured 11,998,500 puds of wrought-iron, and 145,000 puds of steel. Salt was obtained to the value of 14,000,000 rubles, chiefly from salt lakes in Bessarabia and the Crimea, from lake Elton in Astrakhan, and from the inexhaustible layers of rock-salt near Iletzk (q.v.). The total produce of coal from all the Russian mines in 1874 amounted to 83,575,000 puds. Excellent china-clay or kaolin is found near Gluchov, in the government of Tchernigov.

Agriculture and Products.—Russia is an eminently agricultural country, although only a comparatively small portion (271,000,000 acres) is under cultivation. In the *central zone* (see above, under *Surface*), the soil is almost entirely black mold, extremely fertile, and hardly ever requiring manure. The system of husbandry most extensively practiced is what is called the "three-field system," in the working of which, one-third of the land is always in fallow. In the s. and s.e., a system of agriculture peculiar to Russia is in operation: it is called the "fallow system," and consists in raising three or four consecutive crops from the same land, and afterward allowing it to lie fallow for five or six years, after which time it begins to grow feather-grass (*stipa pennata*), which is considered a token of returning fertility. Husbandry, in general, has undergone great changes since the emancipation of the serfs, to whom a considerable portion of the land has been transferred in freehold. The land-owners, deprived of their former right to the labor of their serfs, now find it more profitable to reduce the amount of their land in cultivation, or grant portions of it in lease to the peasants, often in return for the half of the produce of the crop. A great drawback to the development of agriculture is the want of proper means of communication, and consequently the low price of corn in the locality in which it is grown. Fodder-grass is rarely cultivated, as a sufficient supply of fodder is afforded by the extensive natural meadows. The chief cereals are wheat, which is grown as far n. as lat. 62°; rye, barley, and oats. Buckwheat and millet are grown in the s., and from these, but especially from rye, the staple food of the inhabitants is made. Hemp and flax are extensively cultivated; and the oil extracted from the seeds of the former is an indispensable article of the peasant's household, as it is used for food during the fasts, which, taken together, extend over about half the year. Of flax, 12,000,000 puds are annually produced; of hemp, 7,000,000 puds; and 3,000,000 puds of oil-seeds. After the famine of 1839, government introduced, and afterward did much to promote the cultivation of potatoes. The yearly produce of this crop amounts to 35,000,000 *tchetverts* (1 tchetvert = 5.77 imp. bushels). Tobacco crops cover 16,000 acres, and the amount produced is 2,500,000 puds. Beet-root and maize are also cultivated; and there are numerous vineyards in the Crimea, in Bessarabia, and along the Don. Gardening is an important branch of industry, the products being cucumbers, onions, cabbages, and other vegetables and fruits. An area of 486,000,000 acres is covered with woods, but the quantity of timber, from which material the peasant supplies almost all his wants, is at present suffering diminution. The Russian builds his cottage with timber, heats his room with it, lights his house with firewood, makes his household utensils from the same material, as well as his cart, etc.; he also wears shoes, and uses mats for coverings, which are made from the inner bark of the lime-tree. In the n., the forests occupy from 90 to 95 per cent of the whole surface; in the s., they are 2 per cent less than in England. Coniferous trees are the chief in the northern districts; but in the central tracts, oaks, limes, maples, and ashes are the chief. Timber is the chief article of internal commerce, and is floated down the rivers from the well-wooded districts to those which are destitute of wood.

Animals and Animal Products.—In the northern and central provinces, cattle are kept chiefly for the purpose of obtaining manure; but in other parts, cattle-breeding is an important branch of industry. On an average, there are 30,000,000 head of cattle in Russia. Of horses, the best, chiefly trotters, are reared in breeding-stables in the southern central governments; but the great bulk of the horses are obtained from the half-wild studs of the Cossacks, Kalmucks, and Kirghiz. The horses of Viatka, Kazan, and Finland are strong and hardy. The total number of the horses in Russia is about 18,000,000. Sheep-breeding is carried on extensively on the southern steppes. The sheep number 10,000,000, of which upward of 1,000,000 are of the fine merino breed. Besides these animals, there are camels in the s. of Russia, reindeer in the n., and hogs and poultry in great abundance everywhere. A breed of the *urus* (q.v.), a huge and rare animal, which does not occur in any other country, is preserved in a forest of the government of Grodno. Among the wild animals are (chiefly in the n.), the bear, wolf, elk, fox, and marten; on the northern coasts are found the seal and walrus, and the eider-duck and other wild fowl. The more expensive kinds of furs are procured from Siberia, and from the Russian colonies in America, where the Russian-American company has the exclusive privilege of the fur trade. The most important Russian fisheries are those of the Caspian and Black seas, and the sea of Azof, and their tributaries. Herrings, cod-fish, and salmon are caught in abundance in the White sea. Bee culture is very general in Russia, and silk-worms are reared in the Caucasus.—See the statistical works of Sarauw (1873); Von Lengenfeldt (1875); Wilson (St. Petersburg, 1876); and *Russia*, by D. Mackenzie Wallace (1877).

History.—Copious histories of Russia are numerous, those of Karamsin, Solovief (1851–77); Schnitzler (German transl. 1875), being standard Russian works. More accessible are Turgenief, *La Russie* (Par. 1847); Rambaud, *Histoire de Russie* (Par. 1878).—The population of the Russian empire is composed of various nationalities, but the predominant one is the Slavonic (q.v.). The eastern Slaves, the ancestors of the Russians, were settled near the sources of the rivers Volkhof, Bug, Dniester, Dnieper, and Don, and consisted of several tribes whose chief towns were Novgorod and Kief. Being much harassed by their warlike neighbors, and distracted by intestine dissensions, the Slaves of Novgorod and the neighboring Finnish tribes, in 862, sent ambassadors to "the Variags (Varangians, Normans) beyond the sea," inviting their chiefs to come and reign over them. Three brothers of the tribe, called by the old chroniclers *Rurik* (q.v.), Sineous (Sindf), and Truvor, accepted the invitation, and at the head of a band of armed followers (*droujina*) took possession of the territory of Novgorod. Oleg (879–912), who exercised authority as regent to Igor, Rurik's son, took Kief, and made it the capital of the embryo empire, subduing the neighboring tribes, and even successfully attacking the Byzantines. *Igor* (912–945) did nothing of note, but his widow and successor, *Olga* (945–957), was a wise and able ruler. She was baptized in 955 by the patriarch of Constantinople, and abdicated soon after in favor of her son *Sviatoslaf* (957–972), a warlike monarch and a pagan, who was treacherously murdered by a neighboring tribe with whom he was at war. On his death, the principality was divided among his three sons, and the quarrels usual in such cases followed, and continued till *Vladimir* (980–1015), the youngest son, became sole ruler. The Normans now definitively became amalgamated with the Slavonic race. Vladimir's reign is the "heroic" epoch of Russian history; and the glories of the court, and the valiant feats of the warriors of the "sunny prince Vladimir," have been handed down through ages in legend and song. His successful wars extended the boundaries of Russia to lake Ilmen on the north, to the mouths of the Oka and of the Khoper (an affluent of the Don) on the east, to the falls of the Dnieper on the south, and to the sources of the Vistula on the west. He became a convert to the Greek faith, and in 988 was baptized with his followers; his example being shortly followed by the whole nation, for whose spiritual guidance and supervision a metropolitan was established at Kief. He followed the evil example of his father in dividing his dominions, and after his death a civil war broke out among his four sons, in which *Jaroslaf*, prince of Novgorod, was ultimately (1036) successful. This prince did much to civilize his subjects by building towns, founding schools, and especially by ordering the compilation of the first Russian code of laws (the "Rousskaia Pravda"), the most prominent item of which was the limitation of the right of family feud, a limitation which was changed into total abolition after his death in 1054, by his sons, who shared the principality among them. Each of these petty princes in turn divided his portion of territory among his sons, till the once great and united realm became an agglomeration of petty states quarreling with each other, undergoing absorption by a more powerful neighbor, or being redivided. This state of anarchy, confusion, and petty warfare dates from the death of Jaroslaf in 1054, and continued, more or less, till 1478. The principal among the subdivisions of Russia during this period were, according to Russian authorities, *Sousdal*, which occupied the upper and central parts of the basin of the Volga, and from which, in the beginning of the 13th c., sprang the principalities of *Tver*, *Rostof*, and *Vladimir; Tchernigof* and *Seversk*, which occupied the drainage-area of the Dessna (an affluent of the Dnieper), stretching to near the sources of the Oka; *Riazan* and *Murom*, along the Oka basin and the sources of the Don; *Polotsk*, including the basins of the western Dwina and Beresina; *Smolensk*, occupying the upper parts of the basins of the western Dwina and Dnieper; *Volhynia* and *Galicia*, the first drained by the Pripet, the second lying on the n.e. slope of the Carpathian mountains, which were united in 1198; *Novgorod*, by far the largest of all, which occupied the immense tract bounded by the gulf of Finland, the lake Peipus, the upper parts of the Volga, the White sea, and the northern Dwina; and the grand-duchy of *Kief*, which, from its being formerly the seat of the central power, exercised a sort of supremacy over the others. Novgorod, however, from its size and remoteness, as well as from certain privileges which had been granted to it by Jaroslaf, was almost independent of the grand-duchy. The citizens of Novgorod chose their own dukes, archbishops, and in general all their dignitaries, and proved the superiority of their system of self-administration by increasing in power and wealth year by year. One of the chief factories of the great Hanseatic league was established in Novgorod in the 13th century. In fact, so great was its fame throughout Russia, as to give rise to the proverb, "Who can resist God and the mighty Novgorod." The princes of these states had each his standing army, and were continually quarreling; but the people were less oppressed than would naturally be expected under such circumstances, on account of the establishment in each state of a "common council" or *veche*, which exercised an important influence in state affairs, and without which the prince was almost powerless. This period was also marked by the gradual amalgamation of the different Slavic races into one, the present Russian race, a process doubtless aided by the universal dissemination of Christianity, which assimilated their various languages, manners, and customs. The chief of the grand dukes of Kief was *Vladimir*, surnamed "Monomachus" (1113–25), whom chroniclers are never tired of lauding as a model prince, and one whose authority was acknowledged almost as paternal by the princes of the other provinces. In 1163 the ruler of Vladimir took possession of Kief, and proclaimed himself grand duke. In 1222 the Mongol tide of invasion had swept westward to the Polotzes, a nomadic tribe who ranged over the steppes between the Black sea and the Don, and whose urgent prayers for aid were promptly complied with by the Russian princes; but in a great battle, fought (1223) on the banks of the Kalka (a tributary of the sea of Azof), the Russians were totally routed. The Mongols, as usual, did not follow up their victory; but twelve years afterward, Batû Khan, at the head of half a million of Kiptchak Mongols, conquered the e. of Russia, destroying Riazan, Moscow, Vladimir, and other towns. The heroic resistance of prince George of Vladimir cost the lives of himself and his whole army on the banks of the Siti. The Mongol conqueror's victorious career was, however, arrested by the impenetrable forests and treacherous marshes to the s. of Novgorod, and he was forced to return to the Volga. In 1240 he ravaged the s.w., destroying Tchernigof, Galich, and Kief; ravaged Poland and Hungary, defeating the Poles at Wahlstatt, and the Hungarians at Saĭo; but being checked in Moravia, and receiving at the same time the news of the khagan's death, he retired to Saraĭ on the Akhtuba (a tributary of the Volga), which became the capital of the great khanate of Kiptchak. Thither the Russian princes repaired to swear allegiance to the khan, and take part in the humiliating ceremonies which the barbarous conqueror exacted from his tributaries. The taxes of Russia were farmed out by the khan to contractors, who were generally oriental merchants, and they were collected by the aid, when necessary, of the khan's soldiers. But in later times (during the most of the 14th and 15th centuries), when the fiery energy of the Mongols was on the decline, the taxes were collected by the Russian princes and sent to Saraĭ. The Mongol invasion had an evil influence on the political, social, and moral life of Russia; it totally destroyed the elements of self-government, which had already attained a considerable degree of development, arrested the progress of industry, literature, and the other elements of civilization, and threw the country more than 200 years behind the other states of Europe. The principalities of Kief and Tchernigof never recovered this crushing blow, and the seat of the metropolitan was removed to Vladimir. Their decline, however, made room for the rise of Galich to pre-eminence in Western Russia, and under the rule of a series of wise princes it preserved greater independence than any of the Russian principalities, till, in the latter half of the 13th c., it was taken possession of by Kasimir III. of Poland; and about the same time Volhynia was joined to the grand-duchy of Lithuania. The rise of this latter state was much favored by the prostration to which the Russian princes were reduced by the Mongol invasion, and after a flourishing existence of several centuries, during which it extended in power, so as to include Livonia proper, and the Russian provinces of White Russia, Volhynia, Podolia, and the Ukraine, it was joined in 1569 to Poland. On the n. of Lithuania arose in the beginning of the 13th c. another power, the Livonian Knights Sword-bearers, who took possession of Livonia, Courland, and Esthonia, as well as some portions of the territory of Novgorod and Pskov. The grand-ducal title passed after the Mongol invasion from Kief to Novgorod, and afterward to Vladimir, where the celebrated Alexander Newski (q.v.) (1252–63) swayed the scepter. In the beginning of the 14th c., Eastern Russia consisted of the principalities of Sousdal, Nijni-Novgorod, Tver, Riazan, and Moscow, and long and bloody contests took place between the two most powerful of these, Tver and Moscow, for the supremacy. At last, under the guidance of *Ivan Kalita* (1328–40), the founder of the system of administrative centralization which prevailed down to the time of Peter the great, Moscow became the chief grand-duchy. This result was due to various causes, of which the central position of Moscow, the prevalence there of the law of primogeniture, the favor of the Mongol khan, the sympathy of the church, whose head the metropolitan had removed thither from Vladimir in 1325, and the weakness of most of the other princes, were the chief. Ivan's son and successor, *Simeon the Proud* (1340–53), followed in his father's footsteps, as did also the regency which administered the government during the reign of the weak-minded *Ivan II.* (1353–59), and the minority of his son, *Dmitri* (1359–89). Dmitri conquered Nijni-Novgorod, carried on war with success against Tver and Riazan, and profited by the weakness of the Mongol khanate, which was now divided into the four hordes of Nagaisk, Crimea, Kazan, and Astrakhan, to make the first attempt to shake off the shameful yoke under which the Russians had groaned so long. His brilliant victory over the Khan Mamai on the banks of the Don (1380), which conferred on him the epithet of Donskoï, was the first step to liberation; but the succeeding khan, in revenge, burned Moscow, exacted a heavy tribute from the people, and riveted their bonds more firmly than ever. *Vassili I.* (1389–1425) obtained possession of the principality of Nijni-Novgorod with the full consent of the khan, and conquered Rostof and Murom. During his reign Russia was twice invaded by the Tartars, first under Timur, and again under Edijeï, and was at the same time attacked by the Livonians. *Vassili II. the Blind* (1425–62) reigned during a period marked with continual civil wars among the various princes for the grand-ducal throne; but from this period the division of power in eastern Russia rapidly disappeared, internal troubles ceased, and the reunited realm acquired from union the power of casting off the Tartar yoke. These results were achieved by *Ivan III.* (1462–1505), surnamed "the great," who availed himself of every opportunity for abolishing the petty principalities which owed him allegiance as grand-duke, and maneuvered so skillfully, that some of the princes voluntarily surrendered their rights, others bequeathed their lands to him; while others, as the prince of Tver, were reduced by force of arms. The heaviest task of all, however, was the reduction of Novgorod, but so vigorously did Ivan carry out his schemes, that in 1478 this last of the great principalities was added to his empire. He then took advantage of the dissensions between Achmet, khan of the Golden Horde, and Mengli-Gheraï, khan of the Crimean Horde, to deliver Russia from its state of servitude by uniting with the latter; their combined arms destroying the power of the former in 1480; and the kingdom of Astrakhan, which rose on its ruins, was wholly unable to cope with the now powerful monarchy. He next turned his attention to the western provinces, which had formerly belonged to the descendants of St. Vladimir, but were now in the hands of the Lithuanians, under whom the adherents of the Greek church were bitterly oppressed by the Catholics, and accordingly hailed the advance of Ivan's army as a deliverance from persecution. The battle which followed was in favor of the Russians, but was productive of no results of any importance. Ivan married (1472) Sophia, a niece of Constantine Palæologus, the last Byzantine emperor, and introduced the arts of civilization through the medium of architects, founders, coiners, miners, etc., whom he brought from Italy, and the result of whose labors is seen in the Kremlin, and the cathedral of the Assumption (Ouspenski Sobor). He also fortified many towns, introduced to his court the splendor of Byzantium, assumed the title of czar of all the Russias, adopted the arms of the Greek empire, and united the existing edicts into a body of laws, the *Soudebnik*. *Vasili III.* (1505–33) followed closely his father's policy, made war upon the Lithuanians, from whom he took Smolensk, and incorporated with his dominions the remainder of the small tributary principalities. His son, *Ivan IV.* (1533–84), known afterward as "the terrible," became monarch at the age of three years, and the country during his long minority was distracted by the contentions of factious bojars who strove for power. Fortunately, however, on his attaining his majority in 1547, he found two wise and prudent counselors, Sylvestre and Adascheff, who, along with his queen, Anastasia Romanoff (see ROMANOFF), exercised over him a most beneficent influence. The interior administration was remodeled, the "soudebnik" of his grandfather was reformed and amended, the *streltzi*, the first standing army in Russia, were established, and printing introduced. His arms were everywhere victorious; the strongly fortified city of Kazan was captured in 1552, and the kingdom of which it was the capital was annexed to his empire, and the kingdom of Astrakhan shared the same fate soon after. The marauding Tartars of the Crimea were held in check, and the knights sword-bearers attacked and driven from Livonia and Esthonia. About this time a remarkable change came over Ivan's character, which seems to have been in some way connected with the death of his wife, Anastasia. He became suspicious of every one, believed himself surrounded with traitors, banished his two counselors, Sylvestre and Adascheff, and persecuted the bojars, many of whom perished on the scaffold, while others fled to foreign countries. His insane rage fell upon whole towns; thousands of people were destroyed in Tver, Novgorod, and Moscow; and, finally, he murdered his eldest son. Stephen Bathory, king of Poland, meantime wrested Livonia from him, and the Crim-Tartars made an irruption northward, and burned Moscow. It was during the reign of this monarch that western Siberia was conquered for Russia by the Cossack Ermak. See SIBERIA. His son, *Feodor* (1584–98), was a feeble prince, who intrusted his brother-in-law, Boris Godounof, with the management of affairs. Godounof was a man of rare ability and intellect, and proved himself an able administrator. The Russian dominion in Siberia was consolidated, numerous towns and fortresses were erected in the s. as barriers against the Crim-Tartars, the Greek church in Russia was declared independent of the patriarch of Constantinople. Feodor was the last reigning monarch of the house of Rurik, for he died childless, and his only brother, Dmitri, was murdered in 1591 by order of Godounof, according to popular rumor. After the death of Feodor, representatives of all classes were convoked at Moscow to elect a new sovereign, and their choice fell on *Godounof* (1598–1604). The mysterious death of prince Dmitri favored the appearance of pretenders to his name and rank, the first of whom, a supposed monk of the name of Gregory Otrepieff (see DEMETRIUS), was defeated by Godounoff, but on the sudden death of the latter he was crowned in 1605. A revolt, headed by prince *Vassili Shouisky* (1606–10) soon broke out, the czar was murdered, and Shouisky elevated to the vacant throne. But a second false Dmitri now appeared, and Sigismund of Poland, taking advantage of the confusion thus produced, invaded Russia, proclaimed his son Vladislaf czar, and took possession of Moscow (1610), carrying away the czar to die in a Polish prison. At the same time hordes of Tartars, predatory bands of Poles, and gangs of robbers devastated the provinces, and the wretched country was reduced almost to the verge of complete disorganization. But the clergy nobly stood forth to save the state from ruin, and Minin, a common citizen of Nijni-Novgorod, so worked up the feelings of his fellow citizens that they volunteered for military service, and chose as their leader the prince Pojarsky, a man of distinguished valor. Pojarsky retook the capital, drove the Poles out of Russia, and convoked an assembly of representatives, who unanimously chose for their czar *Michael Feodorovitch Romanoff* (1613–45). See ROMANOFF. The first care of the new monarch was to put an end to the revolt of the Don Cossacks, who had set up the son of the first false Dmitri as czar, and to the depredations of the robber-gangs in the s.w. of Russia. In 1617 he concluded a treaty with Sweden, by virtue of which that power received the coasts of the gulf of Finland and a considerable pecuniary indemnity in consideration of Philip, the brother of the Swedish monarch, renouncing his claims to the Muscovite throne. In 1618 and 1634 he purchased peace from the Poles at the cost of Smolensk and a portion of Seversk. Having thus freed himself from all danger of foreign interference, he directed his attention to the internal administration, which, especially the courts of justice, was reduced to a deplorable condition; and to aid him in this necessary task, he summoned a general council of representatives at Moscow. *Alexei* (1645–76), his son and successor, being a minor, the nobles seized the opportunity of increasing their power and exercising oppression and extortion over their inferiors, till rebellions broke out in various districts. Other causes of discontent were the heaviness of the taxes, the oppression of the serfs, the depreciation of the currency, which was changed from silver to copper, and the secession from the Russian Greek church of those who disapproved of the changes and corrections in the books and liturgy of the church introduced by the patriarch Nikon. These malcontents were accordingly persecuted, and fled, some to the n. of Russia, and others to the Ukraine, where they founded many colonies, and still exist apart under the name of "Old Ritualists" (*Staro-obriadzy*). A general council, which was now convoked to deliberate on the best means of restoring peace to the country, revised the existing laws, and composed (1649) a new code—the "Sobornoe Ulajenie," which granted to every subject the right of direct appeal to the czar. Tolls on the highways were abolished, the English and other foreign merchants were deprived of their privilege of free-trade with Russia, and the silver currency reintroduced. The chief events in foreign policy were the acquisition of Little Russia, by the voluntary submission of the Cossacks (see POLAND); a consequent war with Poland, in which Russia acquired Smolensk and the greater part of White Russia; and a war with Turkey, which continued till after the accession of *Feodor* (1676–82), when it was terminated (1681) by the treaty of Bakhtchisarai, by which Turkey gave up all claims to Little Russia. After Feodor's death, the general council of the land, in accordance with his last wishes and their own predilections, chose his half-brother Peter as czar, but his half-sister Sophia, an able and ambitious princess (see PETER THE GREAT) succeeded in obtaining the reins of power as princess-regent. She concluded peace with Poland in 1686, made two unsuccessful campaigns against the Tartars of the Crimea; and after an attempt to deprive Peter of his right to the throne, and failing this, to assassinate himself and his mother, she was forced to resign all power and retire to a convent. All her accomplices were executed; and **Peter** (1689–1725) ascended the throne as sole ruler, his half-brother Ivan being allowed to retain the title of czar conjointly, and to appear as such at public ceremonies, but without any real authority. In order more fully to discover the importance of the changes wrought by Peter in Russia, a brief retrospect of its social and political condition at the date of his accession is necessary. At the head of government stood the czar with absolute power in administrative, judicial, and military affairs. In the exercise of authority he was aided by his council, the "Bojarskaia Douma," and in cases of extreme need by a general council of representatives of the people, which latter, however, possessed only a right of deliberation. The criminal code was cruel in the extreme. Of the standing army the streltzi only deserved the name. The population were divided into two great classes, the *bojars* or nobles, who were bound to render service for their estates, and the *burghus* or industrial and trading classes, and *serfs*, who were bound to the soil. The clergy exercised great influence over all classes, possessed offices in the "douma," and exercised political functions. Agriculture was at a low ebb, and the few manufactories and industrial establishments were in the hands of foreigners. Civilization and learning, which had been introduced during the confederative period, had never recovered the shock they had received from the Mongol invasion, but in later times they entered Russia through the connection of Novgorod with the Hanse league, and from intercourse with Poland, though they never reached the rural population or the lower classes. The education even of the higher classes was limited to reading and writing, and the first school for classics and theology only made its appearance during Feodor's reign. Fine arts were limited to architecture and painting (of sacred subjects) after the Byzantine school. The first newspaper appeared (in Moscow) and the first theater was established during the reign of Alexis. The degraded condition of civilization and the oriental influence of the Mongols left powerful traces on the domestic manners and habits of the Russians, among which was the despotic authority of the father over his household, and the low position of women in domestic life; those of the lower ranks being made mere slaves, while those of higher rank were completely excluded from social intercourse with the other sex, and were condemned to pass a dull and dreary existence in their "terems." Marriages were concluded by the parents without the consent of the bride and bridegroom.

The history of Russia during Peter I.'s reign is merely a biography of that monarch, and under his name is given a brief sketch of the numerous and important improvements effected by him in the government and civilization of his subjects. It must, however, be noted, that in the carrying out of his well-meant schemes, he seldom consulted the national character of his people, or the natural conditions of the country; and consequently, when the irresistible pressure of his high intellect and indomitable will was withdrawn, it was found that, in great part, the civilization which he had forced upon his subjects was but skin-deep. In accordance with the terms of his will, his second wife, *Catharine I.* (q.v.) (1725–27), succeeded him, though the old or anti-improvement part of the nobility supported the claims of the only son of the unfortunate Alexei (q.v.), *Peter II.* (q.v.) (1727–30), who soon after obtained the imperial throne. The reigns of both of these sovereigns were occupied with court quarrels and intrigues, Menchikow (q.v.) during the former, and Dolgorouki during the latter, being the real rulers. On the death of Peter II., the privy council, setting aside the other descendants of Peter I., conferred the crown on *Anna* (q.v.), duchess of Courland, the daughter of Ivan. Her reign (1730–40) was marked by the predominance of the German party at court, who, unchecked by the weak sovereign, treated Russia as a great emporium of plunder, and the Russians as barbarians (see **Biron**). Under their influence, Russia restored to Persia her lost Caspian provinces, and was led into a war with Turkey, which was productive of nothing but an immense loss of men and money. Her successor was *Ivan* (1740–41), the son of her niece, the duchess of Brunswick, Anna Carlovna (q.v.); but he was speedily dethroned by *Elizabeth* (q.v.) (1741–62), the daughter of Peter I., who deprived the German party of the influence it had so shamefully abused, restored the senate to the power with which it had been intrusted by Peter the great, established a regular system of recruiting, abolished tolls, and increased the duties on imports. During her reign, French influence was paramount, and the language of that nation supplanted German at court. Russia gained by the treaty of Abo (1743) a portion of Finland, and took part in the *seven years' war* (q.v.). Elizabeth's nephew and successor, *Peter III.* (q.v.) (1762–62), put a stop to all interference with the quarrels of western Europe, and introduced some commendable ameliorations of the oppressive enactments of his predecessors; but he was speedily dethroned by his able and unscrupulous consort, who, as *Catharine II.* (q.v.) (1762–96), ascended the throne, and proved herself the greatest sovereign of Russia after Peter I. Her successful wars with Turkey, Persia, Sweden, and Poland largely extended the limits of the empire; and while by her foreign policy protecting her subjects from external invasion, she as little forgot the necessity for internal reforms. The laws and administrative arrangements were revised, and the empire was divided into governments (an arrangement which, with very slight modification, still subsists), each government being under a separate administration, both as to matters of polity and justice. Her son and successor, *Paul I.* (q.v.) (1796–1801), at first, through apprehension of the revolution in

France, joined the Austrians and British against France, but soon after capriciously withdrew, and was about to commence war with Britain, when his assassination took place. He gave freedom of worship to the "Old Ritualists," which till this time had been withheld; but he also established a severe censorship of the press, prohibited the introduction of foreign publications, and organized a secret police. His eldest son, *Alexander I.* (q.v.) (1801–25), was at the outset desirous of peace, but was soon drawn into the vortex of the great struggle with France, in which he played a prominent, although at one period an inconsistent part, and raised Russia to the first rank among European states. The character of his rule and the internal improvements he effected are sketched under his name; and an outline of the warlike operations is given in the article NAPOLEON. The holy alliance (q.v.) and the example of conservative policy set by Austria, exercised a pernicious influence on the latter part of his reign; and the higher classes, who had looked for the introduction of at least a portion of the liberal institutions they had seen and admired in western Europe, became so dissatisfied, that when his youngest brother, *Nicholas I.* (q.v.) (1825–55), from whom they had nothing to hope, succeeded, they broke out into open rebellion, which was speedily crushed. A full stop was now put to the rapid advance of Russia's prosperity; wars were declared with Persia and Turkey; and a long and deadly struggle commenced with the Caucasian mountaineers—all for the ill-concealed object of extending Russian domination; and the cession of Erivan and Nahituvan by Persia, of the plain of the Kuban, of the protectorate of the Danubian principalities, and of the free right of navigation of the Black sea, the Dardanelles, and the Danube by Turkey, only whetted his appetite for more spoil. In 1830 he converted Poland (q.v.) into a Russian province; in 1849 he officiously aided Austria in quelling the insurrection of the Magyars; and in 1853 his almost irresistible craving for more territory led him (being, in all probability, under the impression that Turkey would stand alone, as she had always done hitherto) into the Crimean war, in which, though the allies, Britain, France, and Sardina, did not obtain any decided success, Russia suffered immense loss of military prestige on the Danube, at Silistria, the Alma, and before Sebastopol, and was almost drained of her vast resources of men and money. The accession of Nicholas's son, *Alexander II.* (1855)—one of whose first acts was the conclusion of the peace of Paris (1856), by which Russia lost the right of navigation on the Danube, a strip of territory to the n. of that river, and the unrestricted navigation of the Black sea—has been the signal for the revival of those schemes of reform which had been crushed so despotically by the late czar. Alexander's first great reform was the abolition of serfdom, which created 14 millions of new free citizens. Corporal punishment, and the farming-system of the indirect taxes, were also abolished; and the judicial power was separated from the administrative, and founded on trial by jury. The insurrection in Poland (q.v.), in 1863–64, was suppressed with extreme severity; and in 1868 the last relics of Polish independence disappeared in the thorough incorporation of the kingdom with the Russian empire. The subjugation of the Caucasus was completed in 1859. Successive expeditions, the last of which were those against Khiva and Khokan, have resulted in the establishment of Russian supremacy over all the states of Turkestan. In 1876, on the death of the governor-general of the Baltic provinces, their administration was merged in that of the central government. Russia in 1870 intimated that she no longer felt bound by certain conditions of the treaty of 1856, and in a conference at London in 1871 her claims were admitted. The misgovernment of her Christian subjects by Turkey, and her cruel suppression of incipient rebellion in Bulgaria in 1876, led to a conference of the European powers at Constantinople. Turkey rejected the proposals made by the conference with a view to the better administration of the subject provinces; and Russia, to enforce these concessions on Turkey, declared war in April, 1877. At first the Russian progress was rapid; but the energy displayed by the Turks during the summer compelled the invaders largely to augment their forces both in Bulgaria and in Armenia. The chief events in the war were the desperate but unsuccessful attempts to expel the Russians from the Shipka pass in the Balkans, the fall of Kars in November, the resolute defense of Plevna by Osman pasha from July till December, and the capture of the Turkish army of the Shipka in January The armistice signed in Jan., 1878, was followed in March by the treaty of San Stefano; and after diplomatic difficulties that seemed for a time not unlikely to issue in war between Russia and England, a congress of the great powers met at Berlin in June, 1878, sanctioned the rearrangement of the Ottoman empire explained under the article TURKEY, and the cession to Russia of the part of Bessarabia given to Moldavia in 1856, as also of the port of Batum, of Kars, and of Ardahan.

RUSSIAN AMERICA. See ALASKA

RUSSIAN CHURCH, the community of Christians subject to the emperor of Russia, using the Slavonic liturgy, and following the Russian rite. Christianity was introduced into Russia in the 9th c. (see OLGA); but it was not till the end of the 10th that the foundation was regularly laid. In the great schism between the churches of Constantinople and Rome, the Russian church naturally followed silently in the train of Constantinople, yet, at the time of the council of Florence (1439), the adherents of the Roman church throughout Russia were as numerous as those of the Greek party. The complete separation of the Russian church from Rome was effected in the latter part of the same century.

For more than a century from this date the Russian church continued directly subject to the patriarch of Constantinople; but in the year 1588 the patriarch Jeremias, being in Russia, held a synod of the Russian bishops, and erected the see of Moscow into a patriarchate, with jurisdiction over the entire territory; this decree being afterward confirmed by a synod held at Constantinople. This dignity, however, was subordinate to the patriarch of Constantinople, and the subordination was acquiesced in down to the reign of Alexis Michaelowitz, father of Peter the great, when the patriarch of Moscow, Nikon, refused to acknowledge it further. The pretensions of this prelate, and of his successors, however, gave offense to the czar, and one of the first among the great schemes for the reorganization of his empire, conceived by Peter the great, was the suppression of the patriarchate, and the direct subordination of the church to the headship of the emperor. He took his measures, nevertheless, with great deliberation, and on the death of the patriarch Adrian, in 1700, he contented himself with not filling up the vacant dignity, appointing in the mean time, as acting director of ecclesiastical affairs, a bishop with the title of exarch, by whom all matters of importance were to be referred, either directly to the czar, or to a council of bishops, who held their sittings at Moscow. After an interval of 20 years, the public mind having been taught to forget the patriarchate, that office was formally abolished in 1721; and the permanent administration of church affairs was placed under the direction of a council called the "holy synod," or "permanent synod," consisting of archbishop, bishops, and archimandrites, all named by the emperor. Under the direction of this council, a series of official acts and formularies, and catechetical, doctrinal, and disciplinary treatises was drawn up, by which the whole scheme of the doctrine, discipline, and church government of the Russian church was settled in detail, and to which all members of the clergy, and all officials and dignitaries, are required to subscribe. The leading principle of the new constitution thus imposed in the Russian church is the absolute supremacy of the czar; and in order to mark still more signally the principle that the crown is the source of all church dignity and of all ecclesiastical jurisdiction, the arrangement of provinces, archbishoprics, and bishoprics underwent a complete revision; the old metropolitan sees, as they became vacant, were filled up with simple bishops, and not with archbishops as before; and a new arrangement of archbishoprics was established, partly by the act of the czar himself, partly by the interposition of the permanent synod.

The constitution of the Russian church established by Peter has been maintained in substance to the present time. The holy synod is regarded as one of the great departments of the government, the minister of public worship being *ex officio* a member. One of the most cherished objects of the traditional imperial policy of Russia has been to effect a uniformity of religious profession throughout the empire. Dissent, in all its forms, has not only been discouraged, but in many cases rigorously and even cruelly repressed; and as the Roman Catholic dissentients from the Russian church form the most numerous and the most formidable class, they have generally, but more particularly under the late czar Nicholas, been the object of especial severity.

As regards doctrine, the Russian church may be regarded as identical with the common body of the Greek church (q.v.). With that church the Russian church rejects the supremacy of the pope and the double procession of the Holy Ghost. All the great leading characteristics of its discipline, too, are the same; the differences of ceremonial which exist, although in many cases considered by the Russians themselves of vital importance, being too minute to permit our entering into the detail. There is one point on which some explanation may be required. The liturgy of the Russian church is the same as that of the church of Constantinople; but it is celebrated not in the Greek but in the Slavonic language. The service books, however, are not in the modern Russian, but in the ancient language, such as when they were originally translated, with the exception of the modification which they underwent at the time of the patriarch Nikon (see RASKOLNIK, PHILIPPINS), and the further revision under czar Peter. The discipline as to the marriage of the clergy is the same as that described for the Greek church; and in carrying out the law which enforces celibacy upon bishops, the Russians adopt the same expedient with the Greeks, viz., of selecting the bishops from among the monks, who are celibates in virtue of their vow.

Besides the established Russian church, there exists also in Russia a not inconsiderable body of dissenters of various kinds One class of these has been already described under the head RASKOLNIKS. But by far the most numerous dissenters are the Roman Catholics, who are found chiefly in Poland and White Russia. At the partition of Poland a special provision was made for the Roman Catholic people of Poland, under the new government, by the erection of an archbishopric in communion with Rome, at Mohilew, in 1783; and the organization was still more formally completed by the czar Paul, who established, in 1798, five bishoprics under that metropolitan see; and the arrangements of the congress of Vienna having somewhat deranged these ecclesiastical dispositions, a new arrangement was entered into by Pius VII. in 1818. But it cannot be doubted that the whole policy of the Russian government, in reference to the church, makes it almost impossible that they should permit free exercise of worship and of thought to the Catholics in communion with Rome. The direct legislation, and still more the practical administration of Russia in Poland, in reference to marriage, to church property, to conventual establishments, and to ecclesiastical regulations generally, has been a policy of repression and of compulsory proselytism. This policy has been more sedulously pursued since the recent reorganization of Poland. In 1867 the archbishopric of Warsaw was abolished, and all the Roman Catholics of the empire were made subject to the archbishop of Mohilev.

According to the St. Petersburg calendar for 1876, the orthodox adherents of the Russian church were upward of 60,000,000; while the Raskolniks numbered over 1,170,-000. The Roman Catholics, including nearly 4,600,000 in Poland, amounted to about 7,500,000. The government's contribution for the maintenance of religion was upward of £1,350,000.

RUSSIAN LANGUAGE AND LITERATURE. Russian, a principal member of the Slavic family of languages, first became a written language in the time of Peter the great, till which period the Old Slavic—the language of the church—had been the only medium of literary expression, and had, in consequence, exercised an important influence on the Russian popular speech, as on that of other Slavic dialects. The Mongol conquest, and the preponderance of Polish elements in the western parts of the empire, have also introduced into the Russian language a great number of Mongolian and Polish expressions; in addition to which, the efforts of Peter the great to give his subjects the benefits of western culture have enlarged the Russian vocabulary, especially in arts and industry, with numerous German, French, and Dutch words. The chief characteristics of Russian, as a language, are simplicity and naturalness. The grammatical connection of sentences is slight, and the number of conjunctions scanty. Perspicuity and expressiveness are obtained by the freedom allowed in the placing of words. Auxiliary verbs and articles there are none; while personal pronouns may or may not be used along with verbs. The vocabulary of Russian is very rich—foreign words being, so to speak, Russianized. The capability of the language for forming compounds and derivatives is so great, that from a single root not less than 2,000 words are sometimes derived. The purest and most grammatical Russian is spoken in the center, about Moscow. The oldest Russian grammar is that of Ludolf (Oxf. 1696); others are the grammars of the St. Petersburg academy (1802), of Gretsch (Petersb. 1823; new ed., 1834), and of Vostokov (10th ed., Petersb. 1859). A *Russian Grammar for Englishmen* was published at St. Petersburg in 1822, and another (by Heard) in 1827. The best dictionaries are those of the Russian academy (4 vols., Petersb. 1847), of Heym (1803–5), of Schmidt (Lps. 1815), Oldekop (4 vols., 1825), Sokolov (Petersb. 1834), Reiff (1862), and Paulovski (1859). There is an English-Russian grammar and dictionary by Constantinoff (3 vols.).

The beginnings of Russian literature are contemporaneous with the introduction of Christianity by the missionaries Cyril (q.v.) and Method, who employed the Old Slavic church-tongue for literary purposes. To this earliest period belongs—besides the *Prawda Ruskaja*, a book on law—the noted history or chronicle of Nestorius. After the subjugation of Russia by the Tartars, knowledge withdrew into the shelter of the monasteries, whence proceeded several important historical works. During this period of foreign domination the Russian people seem to have sought consolation and hope in writing patriotic ballads and songs about their great hero-king, Vladimir—the Russian Charlemagne—the most celebrated of which is *Igor's Expedition against the Polowzi* (Berl. 1855). When at length the country was freed from the oppression of the Mongols by Ivan I. in 1478, Russian literature received a fresh impulse, but so tardy, nevertheless, were its motions, so circumscribed its achievements, that, up to the commencement of the 18th c., the only notable names that can be mentioned are the metropolitan Makarius (died 1564), who wrote *Lives of the Saints*, etc.; Zizania, the author of a Slavic grammar (Wilna, 1596); and Matviejev (17th c.), who composed several historical and heraldic works. The czar Alexei Michailovitch (whose prime-minister Matviejev was) caused a valuable collection of Russian laws to be printed in 1644, and shortly after founded an academy at Moscow, in which grammar, rhetoric, poetry, dialectics, philosophy, and theology were taught. But from political causes the Polish element now began to predominate in Russian literature, and continued to do so, more or less, until the time of Peter the great, who made his native language the universal vehicle of communication in business and writing. He established schools and founded the famous St. Petersburg academy. During his reign, the metropolitans Demetrius (b. 1651—d. 1709) and Javorskij (b. 1658—d. 1722); the archbishop Prokopovitch (1681—1736); Sellij (d. 1746); the national historian Tatishshev (1686—1750); the poets Kantemir; and the Cossacks, Klimovskij and Danilov; were the most distinguished supports of literature. The first to place on a firm basis the Russian metrical system was Trediakovskij (1703—1769). In the period that followed the death of Peter, the writer that exercised the strongest influence on Russian literature was Lomonossov, who first drew the lines of distinction sharply between Old Slavic and Russian, and established the literary supremacy of the dialect of Great Russia. Among his successors, the poet Sumarokov (1718—1777) did great service in the development of the Russian drama; so did Kniashnin (1742—1791), whose pieces still keep their place on the Russian stage; while Wizin (1745—1792) ranks as one of the first prose writers of his age.—Some of his prose comedies are full of the most genuine humor. Other notable names in poetry, belonging in whole or part to this period, are Cheraskov, Oserov, prince Michailovitch, Dolgoruki, Chvostov, Petrov, Bogdanovicz, and Derzawin (q.v.), the first universally popular Russian poet. Prose literature, however, developed itself more slowly. Lomonossov was for a long time the model that was followed. Among the first to make a fresh reputation were Platon, the metropolitan of Moscow, and Lewanda (1736—1814), archpriest of Kiev; who distinguished themselves from the mass of their bombastic brethren by the strength and vigor of their thinking; the historians Schtsherbatov (1733—1790), Boltin (1735—1792), and Muraviev (1757—1807). Still more important, in the same department, were the labors of the German, Gerh. Friedr. Müller, a native of Westphalia, who in 1755 established at St. Petersburg the first literary journal. Novikov (1744—1818) gave a powerful stimulus to the book-trade and to literary productivity, partly by his professional zeal, and partly by the publication of a satirical journal, entitled *The Painter,* which was widely read.

A new epoch in Russian literature commenced with Alexander I., who was enthusastic in the cause of education and progress. The number of universities was raised to seven; learned societies were also increased. The great ornament of literature at this period was Karamsin (q.v.), who freed it from the trammels of the pseudo-classicism, within which it had been confined by Lomonossov. His labors were continued by Dmitriev and Batjushkov, while Shishkov combated with success the tendency to deprive the language of its Slavic character; and in the poetry of Shakovski, the national elements again reasserted themselves. · Along with these may be mentioned the historian Bolchovitihov (1767–1837) and the theologian Drosdov, archbishop of Moscow; the poets Koslov, prince Alexander, Schachovski (d. 1846), one of the best comic authors of Russia, and possessed of amazing fertility; Gribojedov, Glinka, prince Vjasemski (b. 1792), a celebrated song-writer, elegist, and critic; Davidov, and Gnieditsh. Mersljakov, who died a professor in Moscow, was a very able critic; while Chemnicer (1744–84) and Krylov (1768–1844) rank first among the original fabulists of Russia. Bulgarin and Gretsh belong rather to the most recent period of Russian literature—a period characterized by the predominence of Russian influences, and the complete absorption into the one national spirit of all minor and foreign elements. The late czar Nicholas labored with his wonted passionate energy in this direction. Among the poets of this thoroughly Russian period, the most conspicuous and brilliant is Pushkin (q.v.), whose verses are a mirror of Russian life. in which we see shadowed forth the joys and griefs, the humor and the patriotism, of the true Russian peasant. The most remarkable of Pushkin's contemporaries and successors are the poets Baratynski (d. 1844), baron Delvig, Benediktov, Podolinski, and Lermontov; the dramatists Nikolaus Polevoi and Nestor Kukolnik, who drew the matter of their dramas from the national history; and Gogol (q.v.), one of the most illustrious names in Russian literature. Russian novels exhibit a condition of society in which barbarism struggles for supremacy with a superficial civilization. The best writers in this department are Bestushev, Bulgarin, Sagoskin, whose most popular work, *Jury Miloslavski, or the Russians in* 1612, is modeled after the historical manner of sir Walter Scott; Vasili Ushakov, author of *Kirgis-Kaisak*, etc.; Count Solohub, whose novels give a graphic picture of St. Petersburg society; prince Odojevski, baron Theodor. Korff. Konst. Masalski, and Senkovski, reckoned one of the first journalists in Russia; nor must the name of Alexander Herzen (q.v.), the "liberal Russian" exile, be omitted. The delineations of Cossack life are too numerous for special notice, but they constitute quite a distinct section of the literature of Russian fiction, and are composed for the most part in the dialect of Little Russia. Great attention has also been paid in Russia, as in all Slavic countries, to popular songs and proverbs. The principal collections of these are by Novikov, Kashin, Maximovitch, Makarov, and Sacharov. The latest developments of Russian literature have been chiefly in the department of history, and among the most distinguished names are those of prof. Ustrialov of St. Petersburg, prof. Pogodin of Moscow, Polevoi, Vasili Berg (d. 1834), lieut.gen. Michailovski Danilevski, prof. Snjegirev. Sreznevski, Slovzov, Samailov, Solovjev, Strovjev, Neverov, and Arszenjev. Such philosophy as exists in Russia is mainly an echo of the modern German schools, and therefore possesses no particular originality. Advances in theology are hardly to be looked for as yet from a church so deeply sunk in ignorance and intellectual stupor as the Russian, yet nowhere is reform more urgently required. As writers on jurisprudence, Nevolin, Moroshkin, Spassowitsch, deserve mention; amongst mathematicians, Simonov, Perevoschtschikov, Wesselovski; amongst physicists, Turtschaninov, Metschnikov, Sokolov, Kutorga, Kokscharov; and as linguists, Vostokov, Biliarski, Buslajev. See Borg, *Poetic Works of the Russians* (Ger. 2 vols. Riga, 1823); Gretsch, *Extracts from the Poets and Prose-writers of Russia* (St. Petersb. 1821); Gretsch's *History of Russian Literature* (Peterb. 1822); Jevgenij. *History of Russian Literature* (Petersb. 1818–27–38); König, *Literary Pictures from Russia* (Stuttg. 1837); Otto, *Text-book of Russian Literature* (Lps. 1837; translated into English by Cox, Oxford, 1839); Jordan, *History of Russian Literature* (Lps. 1846); and Talvi (Mrs. Robinson), *Historical View of the Languages aud Literature of the Slavic Nations* (New York, 1850).

RUSSIAS, All the, the official designation of the Russian empire in Europe, was assumed in 1654, when the czar Alexei Mikailowitch styled himself for the first time "Czar of all the Russias," after his conquest of Little Russia and acquisition of Smolensk from Poland. This phrase at first included only Great Russia, White Russia, and Little

Russia. *Great Russia*, formerly called Muscovy, which is by far the largest of these three divisions, includes the territory now comprehended in the 19 governments of Archangel, Olonetz, Vologda, Novgorod, Tver, Jaroslav, Kostroma, Pskov, Smolensk (partly), Moscow, Vladimir, Nijni Novgorod, Kalouga, Toula, Riazan, Tambov, Orel, Koursk, and Voronetz.—*White Russia* included the provinces of Vitebsk, Mohilev, and the rest of Smolensk, and, though long held by the Poles, was re-united to Russia at the first and second partitions of Poland (1772 and 1793). In 1793 it also received the accession of the Polish provinces which now form the governments of Vilna, Minsk, Kovno, Volhynia, Podolsk; and White Russia with these accessions was then denominated *White Russia*.—*Little Russia* contains the ancient Russian possessions in the south-west, which, in the middle ages, became independent under the Cossacks of the Ukraine, and were finally reunited to Russia in 1654; and is divided into the four provinces of Kiev, Tchernigov, Poltava, and Kharkov. During the 18th c. the countries wrested from the Turks, lying between Great Russia and the Black sea, were formed into a fourth great division, under the name of *Southern Russia*. This last includes the districts occupied by the Don Cossacks, sometimes called *New Russia*.—*Red Russia* was a portion of the Russian principality of Galich (Galicia), and, with the rest of it, was subdued by Casimir III. of Poland; it included what is now the province of Lublin, in the kingdom of Poland, and the eastern portion of Austrian Galicia, and is inhabited by Poles, and another and antagonistic people called Russniaks (q.v.).

RUSS'NIAKS, also RUSSINE and RUTHENI, the name of a variety of peoples who form a branch of the great Slavic race, and are sharply distinguished from the Muscovites, or Russians proper, by their language and the entire character of their life. They are divided into the Russniaks of Galicia, North Hungary, Podolia, Volhynia, and Lithuania, and are estimated by Schafarik at 13,000,000. They are almost all agriculturists, and, on the whole, rather uncultivated. Before the 17th c., they were a free race, but were then subjugated, partly by the Lithuanians, partly by the Poles, and for a long time belonged to the Polish kingdom. Their language has consequently become closely assimilated to the Polish. In earlier times it was a written speech, with quite distinctive characteristics, as may be seen from the translation of the Bible, published at Ostrog, in 1581, and from various statutes and other literary monuments still extant. Recently, printing in the Russniak tongue has been recommenced. The Russniaks belong, for the most part, to the United Greek church, but in part also to the non-united. They preserve many old customs peculiar to themselves, and much folk-lore, prose and poetic, very like that current in Poland and Servia. This has been collected by Vaclav in his *Piesni Polskie i Ruskie* (Lemberg, 1833). Levicki has published a *Grammatik der Russinischen Sprache für Deutsche* (Przemzsl, 1833).

RUSSO-GERMAN WAR, the name given by German historians to the last stage of the great European war against Napoleon, beginning with the Russian campaign of 1812 and terminating on the field of Waterloo. See NAPOLEON.

RUST, the name given to a disease of plants, which shows itself on the stems and leaves of many plants, and on the ears of grasses, both of the cereal grasses, and of many pasture or forage grasses; in brown, yellow, or orange-colored spots; and after destroying the epidermis of the plant, assumes the form of a powder, which soils the fingers when touched. Rust seems to consist at first of small fungi of one cell, sometimes divided by a transverse wall, belonging to the genera *uredo* and *puccinia;* which, finally, breaking through the diseased epidermis, form a colored dust consisting of mere spores. The name rust is sometimes restricted to the *uredo rubigo vera*, but it is doubted by some if this is not really a young state of a *puccinia*. Not a few authors regard rust as an eruptive disease (*exanthema*), which makes its appearance chiefly in damp weather, and sometimes extends so far as seriously to injure the plants affected by it, the mycelium and spores which appear in it being regarded as present accidentally, or in consequence of the disease. This, however, is the least probable opinion concerning it.—Rust is sometimes very injurious to crops. No remedy is known for it; but it is certain that rank manures tend to produce or aggravate it. See UREDO.

RUSTCHUK, an important t. of the principality of Bulgaria, and 70 m. w.s.w. of Silistria, on the s. bank of the Danube, opposite Giurgevo. Its position on a range of hills, with its white chimneys, its mosques and minarets rising from amid forests of fruit-trees, give it a striking and picturesque appearance. The Danube is here about 2 m. wide, but its channel is marked with islets and shallows. Rustchuk has manufactures of meerschaum pipes, pottery, saddlery, leather, cloth, tobacco, and silk, and is connected by rail with Varna. It was determined by the Berlin congress in 1878 that the fortifications of Rustchuk, extensive, but not very important, should, like those of the other Bulgarian fortresses, be destroyed. Pop., of which nearly half are Mohammedans, 30,000.

RUSTIC, or RUSTICATED WORK and RUSTICATION. The name of that kind of masonry in which the various stones or courses are marked at the joints by plays or recesses. The surface of the stone is sometimes left rough, and sometimes polished or otherwise dressed. Rustication is chiefly used in classical or Italian architecture, although rustic quoins (q.v.) are often used in rough Gothic work.

RUSTRE, in heraldry, one of the subordinaries, consisting of a lozenge (q.v.) with a circular opening pierced in its center. Ancient armor was sometimes composed of rustres sewed on cloth.

RUTA-BAGA. See TURNIP.

RUTA'CEÆ, a natural order of exogenous plants, consisting mostly of trees and shrubs, but containing a few herbaceous plants. The leaves have no stipules, are simple and entire, lobed, pinnates, or decompound, and are covered with pellucid resinous dots. The flowers are hermaphrodite, sometimes irregular. The calyx has four or five segments; the petals are equal in number to its segments, or wanting, or are united into a monopetalous corolla; the stamens are equal in number to them, or fewer by abortion, or twice or thrice as many. There is a cup-shaped disk. The ovary is sometimes stalked; it has as many carpels as there are petals, or fewer; there are generally two ovules in each carpel. The fruit consists of several capsules, cohering firmly or imperfectly.—There are about 400 known species, natives of the warmer temperate and of tropical regions. The *diosmaceæ* are sometimes separated as a distinct order. A bitter taste and powerful odor are general characteristics. Rue, bucku, and dittany are examples of the order. See also ANGOSTURA BARK and BRUCEA. The barks of a number of tropical species, of different genera, possess febrifugal properties.

RUTGERS, HENRY, 1746–1830; b. New York; educated at Columbia college. He was a capt. in the revolutionary war, several times a member of the New York assembly, and a regent of the university of New York. Rutgers college, to which he gave $5,000, bears his name.

RUTGERS COLLEGE, in New Brunswick, N. J., originally organized by royal charter in 1770, with the title of "Queen's College," which it bore until 1825, when the present name was adopted in honor of col. Henry Rutgers, who made liberal contributions to its fund. It was formerly connected officially with the Protestant Reformed Dutch church, under whose fostering care it grew from a feeble beginning to a high state of prosperity. In 1865 the synod abrogated its official relations to the institution, which thereupon became independent with the exception that the president and three fourths of the trustees are required to be members in full communion of the church by which it was founded. It has an endowment of between $300,000 and $400,000. It has a beautiful campus, well shaded, and eight buildings, well adapted to their respective uses. Its laboratories are large and furnished with excellent apparatus. Its cabinets and collections fill a museum 90 ft. in length by 40 ft. in width, with galleries all around. It has a library of 8,000 volumes, besides the libraries of the literary societies. It has 14 professors, 1 tutor, and 150 students. Its alumni number 1400, including some men of eminence in professional and public life. It has a scientific department, known as the "State Agricultural College of New Jersey, for the benefit of agriculture and the mechanic arts," with 14 professors and 41 students. There is a gymnasium connected with the theological seminary, which is open to the college students. Instruction is given in military tactics, but without drill. A grammar school has been connected with the college for 100 years, and has now about 100 pupils. The first president was J. R. Hardenbergh, D.D.; the second, John H. Livingston, D.D. Its later presidents have been: Philip Milledoler, D.D., 1825–40; Abraham R. Hasbrouck, LL.D., 1840–50; Theodore Frelinghuysen, LL.D., 1850–62; William H. Campbell, D.D., LL.D., 1863, now in office.

RUTH, BOOK OF, one of the Hagiographa, placed in the authorized version, as in the LLX., between Judges and Samuel; and in the Jewish canon, as the second of the five Megilloth, coming after the Song of Songs. It consists of four chapters, and describes how Ruth, the Moabite widow of a Hebrew, Machlon by name, in the time of the Judges, became—by faithful, loving adherence to her mother-in-law, Naomi, for whose sake she had left her home and kindred—the wife of Boaz, and through him the ancestress of David himself. A fragmentary genealogy of David's house—of which the principal links only are given—forms the conclusion of the book, which is characterized throughout by the most naïve simplicity and minute truthfulness of detail. If there be a tendency in the book—which is doubtful—it would naturally be to show how utterly even that strictest of prejudices, in the mind of ancient peoples, especially the Hebrews, against intermarriage with the "stranger," is vanquished by genuine human love and piety; nay, that the heroine of the tale, even a Moabite, was deemed worthy for her virtue to become the foundress of the royal house of Israel. Considering that the book of Kings contains no details about David's genealogy, this book, apart from its indescribable natural charm, becomes a most useful historical record, and further supplies many items on the forms and domestic customs of a time about which we have such very scant information elsewhere.

The time of the events related mounts back to about a century before David, yet both the contents and tendency of the book show clearly enough that it was hardly written before the last years of David's reign, if it was at all written in his lifetime. For a change had already taken place in the interval in the manners and customs of the people (cf. the "in former time," iv. 7), and the genealogy carried down to David, shows the theocratic significance he had acquired by the time it was written.

RUTH, BOOK OF (*ante*), has an undisputed place among the canonical books of the Old Testament. The ancient Jews regarded it as a part of the book of Judges. Its date and author are unknown, though Jewish tradition ascribes it to Samuel. As the time is said to have been "in the days when the judges ruled," it is probable that those days had passed away before the book was written. As a romantic story of ancient oriental domestic life this little book is deeply interesting. The character of Ruth, drawn with great simplicity and skill, has been attractive through many generations and in many lands. Her history strikingly illustrates the providence of God; showing that it extends to individuals, and to the afflicted and destitute; that it overrules calamities, rewards filial piety, and under the Jewish dispensation accepted the consecration even of heathen and foreigners. It has importance in its relation to God's great work of redemption for the world. While different historical books of the Old Testament record the line of Jewish ancestry from whom the Messiah was to descend, the book of Ruth unfolds the providential events by which a heathen woman was introduced into the nation and became a "a mother in Israel" from whom were born David and his greater son, Jesus the Christ.

RUTHENIANS. See RUSSNIAKS.

RUTHE'NIUM (symb. Ru, equiv. 52—new system, 104—spec. grav. 11.3) is a metal discovered in 1843 by Claus in the ore of platinum. In most respects, excepting in its specific gravity, it closely resembles iridium, the colored reaction of the salts being almost without exception the same in both. For details regarding this metal, which is of no practical importance, the reader may consult Deville and Debray's "Memoir on Platinum and its Ores," in the *Annale de Chimie et de Physique*, for 1859.

RUTHENIUM (*ante*) is in that portion of platinum ore which is called osmiridium. When crude platinum is dissolved in nitro-muriatic acid a small quantity of a gray, scaly, metallic substance usually remains behind. This is a native alloy of iridium, osmium, and ruthenium. This is called scaly osmiridium, and is the variety which is the source of extraction of ruthenium. Another variety, also a residue of the same process of digestion of the platinum ore in nitro-muriatic acid, is granular, and rich in iridium and rhodium. To obtain ruthenium, scaly osmiridium is heated to bright redness in a porcelain tube, through which a current of air freed from carbonic acid and organic matter is drawn by an aspirator. This operation produces oxidation of the osmium and ruthenium, the osmium oxide being carried forward and condensed in a solution of caustic potash, while the oxide of ruthenium remains behind, together with the iridium. This residue is then fused with caustic potash, the mass treated with water and allowed to stand in a corked bottle about two hours to clarify. After precipitation an orange-colored solution of rutheniate of potassium is obtained, which, when neutralized with nitric acid, deposits velvet-black sesquioxide of ruthenium, which, when washed, dried, and ignited in hydrogen, yields the metal. Thus prepared, ruthenium is in porous lumps having a specific gravity of 8.6. It is the most refractory of all metals except osmium, but it may be fused by placing it in the hottest part of the oxyhydrogen flame (see OXYHYDROGEN BLOW-PIPE). After fusion its density is 11.4. It is attacked with difficulty by nitro-muriatic acid, but will yield to oxidizing reagents more readily than platinum, or even silver; therefore potash is used in extracting it as above described. There are three chlorides of ruthenium, $Ru\,Cl_2$, $Ru\,Cl_3$, and $Ru\,Cl_4$. There are five oxides, RuO, Ru_2O_3, RuO_2, RuO_3, and RuO_4. The tetroxide, like the tetrachloride, is known only in combination. Sulphureted hydrogen gas, when passed into a solution of either of the chlorides of ruthenium, forms a precipitate of sulphide and oxysulphide of ruthenium mixed with free sulphur. The blue solution of the dichloride yields with sulphureted hydrogen a dark-brown sesquisulphide, Ru_2S_3. When sulphureted hydrogen is passed for a long time into a solution of the trichloride, disulphide of ruthenium is precipitated, which becomes dark brown by calcination There are several ammoniacal salts.

RUTH'ERFORD, a co. in s.w. North Carolina, adjoining South Carolina; watered by Broad river; about 870 sq.m.; pop. '80, 15,198—15,184 of American birth, 3,273 colored. The surface is hilly. The soil is only partly fertile. The principal productions are corn, wheat, oats, tobacco, cotton, wool, and molasses. Co. seat, Rutherfordton.

RUTH'ERFORD, a co. in central Tennessee; drained by Stone river and many creeks; traversed by the Nashville and Chattanooga railroad; 530 sq.m.; pop. '80, 36,741—36,653 of American birth, 16,493 colored. The surface is broken, and the soil fertile; cotton, corn, tobacco, wheat, cattle, and pork are the chief products. Co. seat, Murfreesborough.

RUTH'ERFORD, GRIFFITH, d. 1794; b. Ireland; came to this country and lived in the Locke settlement, N. C.; represented Rowena co. in the convention at New Berne, 1775. In 1776 he conducted an expedition of South Carolinians against the Cherokees, destroying their villages. In 1780 he was taken prisoner in the battle near Camden while in command of a brigade; was exchanged and on duty at the evacuation of Wilmington by the British. He was a member of the state senate 1784, removed to Tennessee, and was president of the legislative council of that state 1794. Two counties were named in his honor, one in each state which had claimed his public services.

RUTH'ERFORD, JOHN, 1760–1840; b. New York, nephew of the earl of Stirling; graduated at Princeton college 1776, studied law, and became very wealthy by land investments. He was elected U. S. senator from New Jersey in 1791, and was three times chosen presidential elector.

RUTHERFORD, SAMUEL, 1600–61; b. Scotland; graduated at the university of Edinburgh in 1621; was minister of Anworth in 1627, but silenced in 1636 for preaching against "The Articles of Perth." During the rebellion he was a zealous defender of Presbyterianism. He was professor of divinity in the New college, St. Andrews, in 1639; commissioner to the Westminster assembly, 1643–47; principal of New college in 1649; and was soon made rector of the university. Of his numerous works the following are the most important: *Exercitationes Apologeticæ pro Divina Gratia contra Jesuitas et Arminianos; Due Right of Presbyteries; Lex Rex; The Law and the Prince; Tryal and Triumph of Faith; Survey of the Spiritual Antichrist; Divine Right of Church Government; A Free Disputation against Pretended Liberty of Conscience; Religious Letters.*

RUTHERFURD, LEWIS MORRIS, b. N.Y., 1816; graduated at Williams college 1834; is a lawyer by profession, and has devoted his leisure hours to science; for 25 years has made original investigations in astronomical photography, and has constructed admirable micrometers and other mechanical contrivances which facilitate telescopic and spectroscopic observations.

RUTH'ERGLEN, or, by popular abbreviation, RUGLEN, a royal, parliamentary, and municipal burgh, in Lanarkshire, on the Clyde, 3 m. s.e. of Glasgow. It consists of one long wide street and of several narrow streets or lanes branching from it at right angles. In ancient times it was a place of considerable importance, carried on a large traffic on the river, and embraced Glasgow within its municipal boundaries. Its trade is now mainly dependent upon that of Glasgow, and its inhabitants are employed in weaving muslins for Glasgow manufacturers, and in the mills, print, chemical, and dye-works, and collieries of the burgh and vicinity. Pop. '71, 9,543. In parliamentary representation, it is one of the Kilmarnock district of burghs.

RU'THIN, a municipal and parliamentary borough of North Wales, in the county of Denbigh, 8 m. s.e. of the town of that name, stands on the summit and slope of a hill on the right bank of the Clwyd. The site of the ancient castle, said to have been built in the reign of Edward I., is occupied by a fine modern castellated edifice in Gothic. Pop. '71, 3,298.

RUTHVEN, RAID OF, a conspiracy of note in Scottish history, contrived and executed in 1582 by William, first earl of Gowrie, father of the principal actor in the Gowrie conspiracy (q.v.), in conjunction with lord Lindsay of the Byres, the earl of Mar, and the master of Glammis. The object of the conspirators was to obtain the control of the state by seizing the person of James VI., then a boy of 16, and under the guardianship of the duke of Lennox and earl of Arran. The king being by invitation at Gowrie's seat of Ruthven castle, the conspirators assembled 1000 of their vassals, surrounded the castle, and obtained complete possession of James. Arran was thrown into prison, and Lennox retired to France, where he died broken-hearted. The Presbyterian clergy warmly espoused the cause of the Ruthven lords, who received the thanks of the general assembly, and full indemnity from a convention of estates. Nearly a year elapsed before the king regained his freedom. His feigned acquiescence in his position led the confederates so to relax their vigilance that he was enabled to throw himself into the castle of St. Andrews, whose keeper was in his confidence, and thus to become his own master. Gowrie and the other lords made their submission, and were pardoned; but soon afterward a royal proclamation characterized their enterprise as treason. Gowrie was commanded to leave Scotland; but while waiting for a vessel at Dundee, he was drawn into a conspiracy to surprise the castle of Stirling, for which he was tried and executed.

RU'TILE, a mineral, which is essentially *oxide of titanium* or *titanic acid*, although generally containing a little peroxide of iron. It is of a brown, red, or yellow color; and is found massive, disseminated, in thin laminæ, and in four-sided or six-sided prisms, which are sometimes needle-like, and permeate rock-crystal. It is found also in granite, syenite, gneiss, mica-slate, limestone, chlorite-slate, etc., and its geographic distribution is very wide. It is used to give a yellow color to porcelain.

RUT'LAND, a co. in w. Vermont, bordering on New York; bounded by lake Champlain on the w.; drained by Castleton, Poultney, and other small rivers; traversed by the Vermont Central, the Rensselaer and Saratoga, and the Harlem Extension railroads; 950 sq.m.; pop. '80, 41,830—35,342 of American birth. The surface is mountainous; the highest peak, Killington, is 4,221 ft. high. Hay, wool, potatoes, dairy products, maple sugar, and lumber are the staples. Marble quarries are worked and slate is found. Co. seat, Rutland.

RUTLAND, a t. in central Vermont, chartered as Socialborough, 1772; incorporated 1847; capital of Rutland co. since 1781. In 1784–1804 it was one of the capitals of the state; in the former year a state-house was erected, which is still standing. U. S. courts have been held here since 1791, the date of the admission of Vermont into the union. It was a frontier town during the revolutionary war, having two forts. It is very pleasantly situated on Otter creek; about 6 m. sq.; pop. '80, 12,149. It is on the Rutland and Burlington railroad, the n. terminus of the Harlem Extension, and the e. terminus of the Rutland and Washington, and of the Rutland and Whitehall railroads, and the n.e. terminus of the Rensselaer and Saratoga. It is regularly built, with streets crossing each other at right angles, in a valley between the Green mountain range on the e. and Taconic range on the west. The fashionable watering-place of Clarendon Springs is 6 m. distant. It has many fine residences, 3 brick hotels, 11 churches, public schools, several private schools, the Rutland military institute, 2 Roman Catholic convents, 4 newspapers, 3 national banks with an aggregate capital of $1,000,000, a savings bank with deposits amounting to $650,000, and an efficient fire department. It contains 4 post-offices, Rutland, West Rutland, Centre Rutland, and Sutherland Falls. It has 4 public libraries, and a public reading-room. In the vicinity are extensive ledges of limestone, and the variety called Rutland marble, beds of which lie in the course of Otter creek, and were first quarried in 1830. At West Rutland quarries were opened in 1838, which since 1843 have become the center of the marble interest, and are principally owned by the Rutland Marble company. The business was started by William F. Barnes, who bought the ledges, now known to be of incalculable value, for a yoke of oxen. White marble is found as fine as Carrara, and variegated and brecciated marble. The 16 quarries now being worked employ 750 men; annual production, 2,500,000 sq.ft. of 2 in. marble, and large quantities are exported in blocks; other articles of export are wool, butter, cheese, and slate. Among the manufactures are the channeling machines of the Steam-Cutter company, which have greatly facilitated the production of marble. It has 3 foundries.

RUTLANDSHIRE, the smallest county in England, is bounded on the n.e. by Lincoln, on the s.e. by Northampton, and on the w. by Leicester. Area, 94,889 acres; pop. '71, 22,073. The Wash divides it into two portions, of which the northern is a somewhat elevated table-land, while the southern consists of a number of valleys running e. and w., and separated by low hills. The principal streams are the Welland, forming the boundary on the s.e., and its affluents, the Wash and Chater. Rutlandshire has no manufactures, and its chief mineral production is fine building stone. The climate is mild and healthy, the soil loamy and rich, and there is hardly an acre of waste land in the county. It is not, however, a crop-producing, but a grazing country; and oxen and sheep are reared in great numbers. Rutlandshire, which abounds in pleasing scenery, contains many stately mansions, as well as a number of ecclesiastical remains dating from the Norman period. It returns two members to the house of commons.

RUTLEDGE, Edward, 1749–1800; b. S.C.; brother of John. He read law in London, and practiced with success in Charleston. He was a member of the continental congress 1774–77, and of the board of war in 1776. In the latter year he was a joint commissioner with John Adams and Franklin to treat with lord Howe in regard to peace. He was re-elected to congress in 1779, but did not sit on account of illness. He was taken prisoner at Charleston in 1780, and confined at St. Augustine for 11 months. He was governor of the state from 1798 till his death.

RUTLEDGE, John, 1739–1800; b. S.C.; received a legal education in London; began to practice law at Charleston in 1761, and soon rose to the first rank in his profession. He sat in the stamp act congress at New York in 1765, in the South Carolina convention in 1774, and the continental congress of 1774 and 1775. He was chairman of the committee which framed the new constitution for South Carolina in 1776, and first president under that constitution. In 1779 he was governor of the state, and during the siege of Charleston was given absolute power by the legislature. On the surrender of that town in 1780 he joined the army in the s., with which he remained till the end of the war. He was a member of congress in 1782, chancellor of his state in 1784, member of the covention which framed the federal constitution, and of the state convention which adopted it. In 1789 he was appointed an associate justice of the U.S. supreme court; in 1791 chief-justice of South Carolina, and in 1795 chief-justice of the United States. The latter appointment was not confirmed by the senate.

RU'TULI, an ancient Italian people on the coast of Latium, below the mouth of the Tiber. They belonged to the Pelasgic race; originally separated from the Latini, with whom they were afterward incorporated. Their capital was Ardea, which came into the hands of the Romans about 490 B.C. According to the *Æneid*, Turnus was their king, and hostile to Latinus, who had married his daughter to Æneas, having first promised her to Turnus.

RUVIGADO, a t. of the United States of Colombia, in the department of Cundinamarca. Pop. 10,000.

RU'VO IN APU'LIA, a city of southern Italy, province of Bari, and 22 m. w. of the city of that name. Pop. '72, 15,055. It is built upon a rising ground, contains many churches, and two museums of Italo-Grecian vases, and is famous for its potteries. The staple produce is grain, pulse, and dried fruits. Ruvo in Apulia is the Rubi of Horace.

RUYSBROEK, John, 1293–1381; b. Ruysbroek, near Brussels; became vicar of the church of St. Gudula at Brussels in 1316, living as an ascetic, composing books, exercising benevolence, and laboring for reform. He renounced the secular priesthood in

1352, and entered the new Augustinian convent of Grönendal, near Brussels, of which he became the first prior. He was the leader of the Dutch and German mystics who held that oneness with God was to be attained by meditation. The name *Doctor Ecstaticus* was applied to him. He produced numerous mystical writings, and is regarded in Holland as "the best prose writer of the Netherlands in the middle ages."

RUYSDAEL, or **RUÏSDAEL**, JAKOB, was b. at Haarlem. The date of his birth is uncertain; some make it 1625, others 1630 or 1635. ·It is said that there is a picture by him signed and dated 1645, which makes the last date improbable. He died in 1681. It has been stated that for some years he directed his attention to the study and practice of surgery, but was advised by his friend Nicholas Berghem to devote his time to painting. In his pictures the trees are excellent in form, the foliage touched with sharpness and precision, and the skies are light and floating. His style of composition is entirely original, and characterized by a certain compactness in the arrangement; the Italian painters have generally groups of trees at the sides, and running out of the picture; in Ruysdael's compositions they are almost always massed within the picture. Ruysdael and Hobbima hold about an equal position—namely, that of the best landscape-painters of the Dutch school; but Ruysdael was also equally eminent for his sea-pieces. His etchings, seven in number, are much prized by collectors. Jan van Kessel and Jan Renier de Vries were imitators of Ruysdael. His elder brother, *Salomo* (b. *circa* 1613, d. 1676), was also a painter of some note.

RUYS'SELEDE, a t. in w. Flanders, Belgium; pop. about 7,500. It is the seat of a celebrated reformatory institution for boys and girls. This institution, which was founded by the government in 1849, is intended for beggars, vagrants, etc., liable to become members of the criminal classes. It consists of two separate schools for boys, and one for girls. The limits of admission are between 7 and 18 years, commitments being made for minority. The inmates are taught various trades, and in the summer and spring work upon a model farm of 240 acres, finely stocked with cattle, and having attached to it a kitchen-garden of about 20 acres. The reformatory not only pays expenses, but leaves a good profit. Some of the boys are trained for the sea. The girls work in the laundry, sew, make lace, etc. The earnings are over $20,000 annually. The inmates remain at the school, on an average, 3 years. Most of them turn out well. Over 5,000 boys have been members of the institution.

RUYTER, MICHAEL ADRIAANSZOON VAN, Dutch admiral, was b. at Vlissingen in 1607, of poor parents, who sent him to sea as a cabin-boy when only 11 years old. He became a warrant officer, and in 1635 rose to be a capt. in the Dutch navy. After serving several years in the Indian seas, he was, in 1645, made rear-admiral. He engaged and sunk a piratic Algerine squadron off Sallee in 1647. In 1652, when war broke out between the States and England, then under the protectorate, he was placed in command of a squadron, and ordered to convoy a large number of merchant-ships. He was met by the English fleet under sir G. Ayscough off Plymouth, and an engagement took place. Neither of the fleets gained any decisive advantage; but Ruyter succeeded in saving his convoy. In 1653, when a fight of 3 days took place between the English and Dutch fleets off Portland, Ruyter commanded a division under Van Tromp. The English, under Blake, finally obtained a great victory, taking and destroying 11 Dutch men-of-war and 30 merchantmen. The States-General, in 1659, sent him to assist Denmark against Sweden. He defeated the Swedish fleet, and obtained a title of nobility and a pension from the king of Denmark. In 1664 he fell upon the English factories at Cape Verde, and attempted to seize the island of Barbadoes. As other depredations of the Dutch upon English merchants, as well in the East Indies as on the high seas, were complained of, war was declared against the Dutch. In June, 1666, Ruyter and Van Tromp, with 90 sail, engaged the English fleet under prince Rupert and the duke of Albemarle. Both sides fought with such obstinacy that the battle lasted four days, and ended without any decisive result. In July the conflict was renewed, when the English gained a complete victory, destroying above 20 of Ruyter's men-of-war. In 1667 he destroyed the shipping at Sheerness, sailed up the Medway as far as Chatham, burned several English men-of-war, and effected more toward the conclusion of peace at Breda (1667) than any diplomatist. In 1671 he commanded the Dutch fleet and fought several battles with the combined English and French fleets, but without decisive results. In 1675 he was sent to the Mediterranean. He fought, off the coast of Sicily, a desperate battle with the French fleet, under the celebrated admiral Duquesne. Victory declared itself on the side of the French; but Ruyter made good his retreat into the harbor of Syracuse. He had his legs shattered in the engagement, and died of his wounds, April, 1676. Europe did justice to his bravery; and Louis XIV. said he could not help regretting the loss of a great man, although an enemy. His death was deeply mourned by his countrymen, and a splendid monument was erected to his memory at Amsterdam.

RYAN, STEPHEN VINCENT, D.D., b. Upper Canada, 1826; educated at St. Charles's seminary, Philadelphia, and at St. Mary's seminary, Barrens, Mo.; ordained Roman Catholic priest in St. Louis in 1849; professor at St. Mary's seminary; president of St. Vincent's college, Cape Girardeau, Mo., in 1856; consecrated bishop of Buffalo in 1868.

RYAN, LOCH. See WIGTOWNSHIRE.

RYBINSK', a district t. of Great Russia, in the government of Jaroslav, stands on the right bank of the Volga, 418 m. e.s.e. of St. Petersburg. It is the great center of the corn trade on the Volga, and, after Nijni-Novgorod, is the chief commercial center on that river. The trade of Rybinsk consists principally in transhipping and forwarding to the capital the goods brought hither by large vessels up the Volga. For this purpose, upward of 6,000 barges are built here every year. The landing-place extends along the river for several miles, and is divided into 9 sections, each of which is appropriated to special varieties of goods. The chief articles of trade are corn, flour, tallow, spirits, metals, and timber, and these are forwarded to St. Petersburg by 3 systems of communications, of which the Mariinsky canal conveys goods to the value of £5,000,000; the Tichvin canal, goods to the value of £4,000,000; and the Vyshnivolotsk canal, goods to the value of £2,000,000. There is, besides, the railway. Pop. '67, 14,600.

RYDE, a flourishing and fashionable watering-place and market-t., on the n. coast of the isle of Wight, Hampshire, occupies the e. and n. slopes of a hill, 6 m. s.s.w. of Portsmouth, from which it is separated by the roadstead of Spit Head. It consists of Upper and Lower Ryde; the former anciently called *Rye*, or *La Riche*, and the latter of quite modern construction. The shores are wooded to the verge of the water, and the appearance of the town, with its streets and houses interspersed with trees, is pleasing and picturesque. The pier, nearly a mile in length, forms an excellent promenade. Yacht and boat-building are carried on to some extent. Steamers cross every hour to Portsmouth in summer, and several times a day in winter. Ryde, the largest town in the island, had, in 1871, 11,260 inhabitants. Ryde is connected with Ventnor by a railway.

RYDER, JAMES, D.D., 1800-60; b. Dublin; came to America in early youth; entered the novitiate of the society of Jesuits in 1815; studied at Georgetown college, Md., 1815-20; at Rome, 1820-25; ordained at Rome in 1825; was professor of theology and the sacred Scriptures in the college of Spoleto, Italy, 1825-28; was for several years professor of theology and philosophy in Georgetown college, and also its vice-president; pastor of St. Mary's church, Philadelphia, in 1839; and of St. John's church, Frederick, Md., in 1840; president of Georgetown college, 1840-45, and again, 1848-51; president of the college of the Holy Cross, Worcester, Mass., 1845-48. He was also superior of the order of Jesuits in North America. He was a contributor to the *Encyclopædia Americana*, and has published some *Lectures* and *Discourses*.

RYDER, WILLIAM HENRY, D.D., b. Mass., 1822; ordained and became pastor of a Universalist church in Concord, N. H., 1843; and of a church in Nashua 1845. In 1848 he visited Europe and Palestine; studied in Berlin; settled as pastor in Roxbury, Mass., in 1850, and in 1869 at St. Paul's church in Chicago, Ill.

RYE, *Secăle*, a genus of grasses, allied to wheat and barley, and having spikes which generally consist of two-flowered, rarely of three-flowered, spikelets; the florets furnished with terminal awns, only the upper floret stalked. One species (*S. cereale*) is a well-known grain. It has when in fruit a roundish-quadrangular spike with a tough rachis. Its native country, as in the case of the other most important cereals, is somewhat doubtful; but it is said to be found wild in the desert regions near the Caspian sea and on the highest mountains of the Crimea. It has long been cultivated as a cereal plant, although the supposed mention of it in Exodus ix. 32 is doubtful, spelt being perhaps intended. It is much cultivated in the north of Europe and in some parts of Asia. Its cultivation does not extend so far n. as that of barley; but it grows in regions too cold for wheat, and on soils too poor and sandy for any other grain. Its ripening can also be more confidently reckoned upon in cold regions than that of any other grain. But rye succeeds best and is most productive in a climate where wheat still ripens. It delights in sandy soils. The varieties of rye are numerous, although much less so than those of other important cereals. Some are best fitted for sowing in autumn, others for sowing in spring. The former kinds (*winter rye*) are most extensively cultivated, being generally the most productive. In some places on the continent of Europe rye is sown at midsummer, mowed for green fodder in autumn, and left to shoot in spring, which it does at the same time with autumn-sown rye, producing a good crop of small but very mealy grain. In Britain rye is not a common grain crop, and is cultivated to a smaller extent than it formerly was; the sandy soils to which it is best adapted being improved and fitted for other kinds of corn. It is, however, sometimes sown to be used as a green crop for feeding sheep and oxen in winter, and is found particularly good for milch cows. It is sometimes also mown for horses and other animals.—Bread made of rye is much used in the north of Europe. It is of a dark color, more laxative than that made of wheat flour, and perhaps rather less nutritious. Rye is much used for fermentation and distillation, particularly for the making of *Hollands*. Rye affected with ergot (q.v.) is a very dangerous article of food. The straw of rye is tougher than that of any other corn-plant, and is much valued for straw-plait.—PERENNIAL RYE (*S. perenne*) differs from common rye in having a very hard, red-like culm; ears 3 to 5 in. long, flatly compressed, with a brittle rachis, and 50 to 60 closely imbricated spikelets. It endures for many years, but is not much cultivated, as its grain is slender and does not yield an easily separable flour.

RYE, a t. in Westchester co., N. Y., on Long Island sound; pop. of township, 5,966. The village is on the New York and New Haven railroad, 2 m. s.w. of Port Chester, and 24 m. n.e. of New York. Rye Beach, in the same township, is a favorite summer resort. In the town are many handsome residences of business men of New York. It contains three churches and an excellent institution for the education of young ladies. In this town is the thriving village of Port Chester, on Byram river, the boundary between New York and Connecticut.

RYE, a sea-port, market-t., and parliamentary and municipal borough in the s.e. of the co. of Sussex, 10 m. n.e. of Hastings. It is charmingly situated on an eminence bounded e. by the Rother, and s. and w. by the Tillingham, which streams unite here, and entering the sea 2 m. below the town form the old harbor. The appearance of the town is remarkably quaint and old-fashioned. Overlooking the junction of the streams is a small castle built by William de Ypres in the reign of Stephen, and now used as a jail. The church is a beautiful and interesting structure—the central tower, transepts, a number of circular arches, etc., all being early Norman. In former times the sea flowed close up to Rye, washing the rock on which the Ypres tower stands, but it has retired to a distance of 2 miles. The harbor admits vessels of 200 tons, and has been recently improved. This ancient town receives historical mention as early as 893. It was walled on two sides by Edward III., and contributed nine ships to the fleet with which that monarch invaded France. Brewing, ship-building, and trade in corn, hops, etc., are carried on. Rye is one of the cinque-ports, and sends a member to parliament. Pop. '71: of municipal borough, 3,865; of parliamentary borough, 8,290.

RYE-GRASS, *Lolium*, a genus of grasses, having a two-rowed, flatly-compressed spike, the spikelets appressed edgewise to the rachis. Common Rye-Grass, or Perennial Rye-Grass (*L. perenne*), the *ray-grass* of the older English authors, is frequent on waysides, and in meadows and pastures, in Britain and on the continent of Europe. The spikelets are much longer than their solitary external glume, 6 to 8 flowered; the florets awnless or nearly so; the culm flattened, from 1 ft. to 3 ft. high; the root producing leafy barren shoots, which add much to the agricultural value of the grass. This grass is highly valued for forage and hay, and is more extensively sown for these uses than any other grass, not only in Britain, but on the continent of Europe and in North America. It grows well even on very poor soils. The *common perennial rye-grass* is the kind most generally cultivated. A kind called *annual rye-grass*—not really an annual plant, although useful only for one year—is sometimes cultivated; but is in almost every respect inferior.—Italian Rye-Grass (*L. Italicum*, or *L. multiflorum*, or *L. Bouchianum*), a native of the south of Europe, is much esteemed as a forage and hay grass. In many soils and situations in Britain it succeeds extremely well, and is remarkable for its verdure and luxuriance in early spring. It is preferred by cattle to the common rye-grass. The young leaves are folded up, whilst those of the common rye-grass are rolled together. —There are many varieties of rye-grass. It is nowhere so much valued or cultivated as in Britain. It was cultivated in England before the end of the 17th century. Italian rye-grass was introduced into Britain in 1831 by Mr. Thomson of Banchory, and Messrs. Lawson & Son of Edinburgh. Rye-grass is generally sown along with some kind of corn, and vegetating for the first year among the corn, appears in the second year as the proper crop of the field.

RYEHOUSE PLOT. In 1683, at the same time that a scheme was formed in England among the leading whigs to raise the nation in arms against Charles II., a subordinate scheme was planned by a few fiercer spirits of the party, including col. Rumsey and lieut.col. Walcot, two military adventurers; Goodenough, under-sheriff of London; Ferguson, an independent minister; and several attorneys, merchants, and tradesmen of London—the object of which was to waylay and assassinate the king on his return from Newmarket. The deed was to be perpetrated at a farm belonging to Rumboldt, one of the conspirators, called the Ryehouse farm, whence the plot got its name. The Ryehouse plot is supposed to have been kept concealed from Monmouth, Russell, Shaftesbury, and the rest of those who took the lead in the greater conspiracy. It owed its defeat to the circumstance that the house which the king occupied at Newmarket took fire accidentally, and Charles was thus obliged to leave that place eight days sooner than was expected. Both the greater and lesser conspiracy were discovered before long, and from the connection subsisting between the two it was difficult altogether to dissever them. The indignation excited by the Ryehouse plot was extended to the whole whig party; lord Russell, Algernon Sidney, and lieut.col. Walcot were brought to the block for treason; John Hampden, grandson of his more noted namesake, was fined £40,000; and scarcely one escaped who had been concerned in either plot.

RYERSON, Adolphus Egerton, d.d., ll.d., b. Charlotteville, Upper Canada, 1803; was a teacher; and in 1825 entered the Wesleyan ministry; established in 1829 and for some years edited the *Christian Guardian;* was a delegate to the British conference in 1832–36, and 1840; appointed in 1841 principal of Victoria college, Coburg, C. W.; chief superintendent of education for Upper Canada in 1844. In 1849, after visiting the United States and studying the public school system, he submitted a plan for organizing the common school system in Canada, which was adopted. He published a history of Canada and of the *British United Empire Loyalists of America.*

RYLAND, John, 1753–1825; b. England; was so precocious that he read the Psalms in Hebrew at 5 years of age, and the Greek Testament through before he was 9; preached at the age of 17 to the Baptist church at Northampton; assisted his father in his school; 1770–75; became pastor of the Northampton church in 1776. In 1792 he aided in the organization of the Baptist missionary society at Kittering; became pastor of the Broadmead chapel and president of the Baptist college at Bristol in 1793, both of which positions he held for 33 years. In 1815 he became secretary of the Baptist missionary society.

RYMER, Thomas, 1638–1713; b. England; educated at Cambridge, and called to the bar. He succeeded Shadwell as historiographer to William III. in 1692. He wrote a *Short View of Tragedy*, 1693, in which he attacks Shakespeare. In 1694 appeared his translation of Rapin's *Reflections on Aristotle's Treatise of Poesie*. His only valuable work is the *Fœdera*, a collection of all the treaties of English with foreign sovereigns. It appeared in 17 volumes about 1700.

RY'OT (from the Arabic *raaya*, to pasture, to protect, to govern; hence, literally, the governed, a subject) is the vernacular term for a Hindu cultivator or peasant.

RYOTWAR (literally, according to or with ryots) is the term applied to the revenue settlement which is made by the government officers in India with each actual cultivator of the soil for a given term—usually a twelvemonth—at a stipulated money-rent, without the intervention of a third party. This mode of assessment prevails chiefly, though not exclusively, in the Madras presidency. See H. H. Wilson, *Glossary of Judicial and Revenue Terms* (Lond. 1855), under Râiyatwâr.

RYSBRACH, Michael, a sculptor of considerable talent, b. at Antwerp in 1693. He settled in London in 1720, and executed numerous works there, in particular the monuments to sir Isaac Newton in Westminster abbey, and to the duke of Marlborough at Blenheim, a bronze equestrian statue of William III. for the city of Bristol, a colossal statue of George II. for the parade at Greenwich hospital; a Hercules, and busts of many of the eminent poets, wits, and politicians of his time. Scheemakers, also a native of Antwerp, and Roubilliac, a Frenchman, were contemporaries and rivals of his, and shared with him most of the commissions for works of sculpture in England at the period. With Scheemakers was placed as a pupil Nollekens, who became so distinguished for his busts, and as one of the founders of the English school of sculpture. Rysbrach died Jan. 8, 1770.

RYS'INGH, John Claude, was secretary of the chamber of commerce at Stockholm, and in 1654 was sent out as vice-governor of the Swedish colony on the Delaware. He surprised and took possession of the Dutch fort Casimir, but the Dutch in 1655 attacked New Sweden, and put an end to Swedish power in that region.

RYSWICK, PEACE of, a treaty concluded in 1697 at Ryswick, a Dutch village between Delft and the Hague, which was signed by France, England, and Spain on Sept. 20, and by Germany on Oct. 30. It put an end to the sanguinary contest in which England had been engaged with France. It has been often said that the only equivalent then received by England for all the treasure she had transmitted to the continent, and all the blood which had been shed there, was an ackowledgment of William's title by the king of France; but it must not be forgot how much the allies were benefited by the check given to the gigantic power and overweening ambition of France.

S

S, **THE** nineteenth letter in the English and other western alphabets (the eighteenth in the Latin), belongs to the dental series, and marks the fundamental sound of the hissing or sibilant group, *s*, *z*, *sh*, *zh*. The Sanskrit has characters for three hissing or *s*-sounds; the Shemitic languages had four (see Alphabet). The Hebrew or Phenician character, from which the modern *s* is derived, was called *shin*—i.e., tooth, and in its original form probably represented two or three teeth. The same character, with the presence or absence of a diacritic point, marked either *s* or *sh*. In England, *s* is used both for the sharp and flat sounds, as *this*, *those* = *thoze*. The nearness of the *s*-sound to *th* is seen in the English *loves* = *loveth*, and in the phenomenon of lisping—*yeth* = *yes*. This seems to furnish the transition to the so frequent interchange of the High-Ger. *s* for the Low-Ger. *t*, as in Ger. *wasser* = *water;* Ger. *fuss* = *foot.* Comp. Gr. *thalassa* = *thalatta*. The substitution of *r* for *s* is noticed under R. In such cases as *melt*, compared with *smelt; pike*, with *spike; lick*, with *sleek;* Ger. *niesen*, with Eng. *sneeze;* Eng. *snow*, Goth. *snaivs*, with Lat. *nix* (gen. *niv*-is); Gr. *mikros*, with *smikros; short*, A.-S. *sceort*, with *curt*—it is difficult to say whether the form with, or that without the *s* is the older. Grimm considers *s* as the remnant of an old prefixed particle (*as*, *is*, *us*), having, perhaps, the force of *ex* in Lat. *exopto*, I wish greatly; or *ur* in Ger. *urklein*, very small. An initial *s* before a vowel in Lat. corresponds to Gr. *h;* comp. Lat. *sub*, *sex*, *sal* (salt), with Gr. *hypo*, *hex*, *hals*. In Greek and Latin, *s* was pronounced feebly at the end of words, and still more so between two vowels. It thus frequently disappeared in these positions, and this was one of the chief sources of the irregularities in the declensions and conjugations, which had originally been formed on a uniform system (see INFLECTIONS.) The dropping of *s* is one of the ways in which the forms of modern French words have become so degraded; compare Lat. *magister*, old Fr. *maistre*, modern Fr. *maître; presbyter, prestre, prêtre.* Even where still written, final *s* in French is mostly silent—e.g., *vos, les.*

SAAD-ED-DIN, a Turkish historian, was b. in 1536, and died at Constantinople in 1599. His history, entitled the *Taj-al-Tuarikh* (the crown of histories), a work held in high estimation by scholars, gives a general account of the Ottoman empire from its commencement in 1299 till 1520; it has never been printed, but MS. copies of it are found in most of the great libraries of Europe, and an inaccurate translation into Italian was published in 1646–52. Saad-ed-din also wrote the *Selim-Nameh*, or history of Selim I., which is chiefly a collection of anecdotes regarding that prince.

SAA'DI, SHEIK MOSLIH ED-DIN. See SADI, *ante.*

SAADIA BEN JOSEPH, 892–942; b. Fayûm, Egypt; was a distinguished Jewish philosopher and poet; an instructor in the school of Sura in Babylonia in 928. He wrote in Hebrew and Arabic; published poems on the history and laws of the Jews, a translation of the Pentateuch into Arabic, and a treatise on *Religions and Doctrines*, which was translated into Hebrew under the title of *Emunoth Vedebth.*

SAA'LÉ, a river of Germany, distinguished from other and smaller rivers of the same name as the Saxon or Thuringian Saale, rises on the western slope of the Fichtelgebirge (Bavaria), and flowing northward through several minor states, and finally across the Prussian province of Saxony, falls into the Elbe, about 25 m. above Magdeburg, after a course of 200 miles. It is navigable only within the Prussian dominions.

SAAR'BRÜCKEN, a t. of Rhenish Prussia, on the Saar, 40 m. s.s.e. of Treves. It is the seat of an active industry, of which coal-mining, spinning, and the manufacture of woolen and linen fabrics, and of pottery and tobacco, are among the principal branches. Pop. '75, 9,047. It was at Saarbrücken that the French and German armies first met in the war of 1870–71.

SAAR'DAM. See ZAANDAM.

SAARLOU'IS, a t. of Rhenish Prussia, 31 m. s.s.e. from Treves, and between four and five m. from the frontier of France. It stands on the left bank of the Saar, a branch of the Moselle, and is a place of some strength, being walled, and containing several forts. It is of considerable importance as a border fortress. There are manufactures of fire-arms in the town, and lead and iron mines in the neighborhood. There are also wire-works. Saarlouis was long in the possession of France, and was fortified by Vauban in the reign of Louis XIV. The congress of Vienna gave it to Prussia in 1815. Pop. '75, 6,807.

SAAZ, a t. of Bohemia, on the Eger, 45 m. w.n.w. of Prague. Hops are largely cultivated in the vicinity, and important corn-markets are held. Pop. 8,870.

SABADELL', a rising manufacturing t. of Spain, in Catalonia, 14 m. by railway n.w. of Barcelona. It has risen into importance only within recent years, and it is now the Manchester of Catalonia. Woolen and cotton fabrics are the staple manufactures, and of the 100 factories in the town, by far the greater number are engaged in these manufactures. Pop. about 16,000.

SABADILLA, CEBADILLA, or CEVADILLA, *Asagræa officinalis*, formerly *Helonias officinalis*, a Mexican plant of the natural order *melanthaceæ*, the seeds of which are employed in medicine, because of properties analogous to those of white hellebore (*veratrum album*). The plant has a bulbous root, and grows in tufts; the leaves are linear and grassy, about four ft. long, and not above a quarter of an inch broad; among them rises a round *scape* (leafless flower-stem), about six ft. high, bearing a very dense raceme, a foot and a half long, of small white flowers. The seed-vessels are papery *follicles*, three together; the seeds one, two, or three in each follicle, two or three lines long, winged, and wrinkled. The powdered seeds have been known in medicine since the end of the 16th century. On submitting them to chemical analysis, they are found to consist of fatty matter, two special organic acids, to which the names *cevadic* and *veratric* acids have been given; of varieties of resin, yellow coloring matter, gum, and a highly poisonous alkaloid named *veratria* in combination with gallic acid; and to these constituents a French chemist, Couerbe, has added a crystalline body named *sabadilline.*

Notwithstanding its highly poisonous properties, Sabadilla is prescribed on many parts of the continent as a vermifuge in cases of tape-worm and ascarides, and it may be administered to an adult in 8 or 10 grain doses, mixed with a little sugar, and a few drops of oil of fennel. In the form of powder, it is sometimes applied to the head to destroy lice, but if the skin be broken, some other remedy should be selected, as absorption to a dangerous extent might ensue. From its stimulating properties, it is usefully employed in the form of tincture (which, however, is not an officinal preparation) as an external application in chronic rheumatism and paralysis, and in cases of nervous palpitation.

The active principle of Sabadilla, the *veratria*, in doses of $\frac{1}{12}$ of a grain, gradually increased, and taken thrice a day, has been found very efficacious in acute rheumatism; and applied in the form of ointment, it has been highly recommended in scrofulous diseases of the joints. When prescribed internally, its use should be at once suspended if the patient complain of pain in the throat or stomach, vomiting or diarrhea.—Similar qualities are said to exist in the seeds of *veratrum sabadilla*, a native of Mexico and the West Indies, and in some of the species of *helonias*, natives of the southern parts of North America.

SABÆ'ANS, the supposed descendants of one, two, or three Shebas mentioned in the Bible. Historically, the Sabæans appear chiefly as the inhabitants of Arabia Felix or Yemen (to the n. of the present Yemen), the principal city of which was called Saba, and the queen of which is said to have visited Solomon, attracted by the fame of his wisdom. Josephus, however (*Ant.* viii. 6, 5), makes her the queen of Ethiopia (Meröe), and the modern Abyssinians claim her as their own. Her name, according to their tradition, was Makeda; and her visit to Jerusalem made her not only a proselyte to the religion of Solomon, but she became one of his wives, and had by him a son, Menilek, who afterward ruled Ethiopia (q.v.). The Arabs, on the other hand, called her Balkis, the earliest name that occurs of a Himyaritic queen; but there is no more historical value to be attached to this tradition than to the innumerable legends that have clustered round her name in connection with the great king.

Numerous passages in Greek and Roman writers, as well as in the Bible, testify to the vast importance of these dwellers in Yemen as a wealthy, widely-extended, and enterprising people, of fine stature and noble bearing. Their chief greatness lay in their traffic, the principal articles of which consisted of gold and perfumes, spice, incense and precious stones, a very small portion of which, however, was of home production, Yemen being only productive in corn, wine, and the like matters of ordinary consumption. But the fact was, that the Sabæans held the key to India, and were the intermediate factors between Egypt and Syria, which again spread the imported wares over Europe; and even when Ptolemy Philadelphus (274 B.C.) had established an Indian emporium in Egypt, the Sabæans still remained the sole monopolists of the Indian trade, being the only navigators who braved the perilous voyage. As in many other respects, they also resembled the Phenicians in this, that, instead of informing other people of their sources and the tracks of their ships, they told them the most preposterous tales about the countries they visited, and the fearful dangers they encountered; and in regard to most things, endeavored to impress upon the minds of their customers that what they sold them was, if artificial, their own manufacture—if natural products, home growth. Being the principal merchants of those things which the over-refined luxury of late classical times considered as absolute necessities of life, they could not fail to gather enormous riches; e.g., in the 3d c. of the Roman empire, every pound of silk—a material enormous quantities of which were used—that came from Arabia was paid by a pound of silver, at times even of gold. As a natural consequence, the Sabæans became luxurious, effeminate, and idle. The pictures of them drawn by the classic writers are doubtless exaggerated. The country itself, according to the reports of Greek writers, grew spice-wood to such an extent that its odor caused apoplexy among the inhabitants, and bad smells had to be used to counteract these over-potent influences. The meanest utensils in the houses of these merchant princes were—if we were to credit those writers—wrought in the most cunning fashion, and were of gold and silver; their vases were incrusted with gems, their firewood was cinnamon. Their colonies must, in the nature of things, have extended over immense tracts of Asia—the Ethiopian Sabæans probably being one of the first foreign settlements; yet nothing beyond the vaguest conjectures can be given about them. Regarding their government, Dio Cassius informs us that they had a king, who never was allowed to leave his palace, and that the first child born, after the accession of a new king, into one of a certain number of noble families, was considered the heir-presumptive for the time being. Commerce had also done for them what it did for the Phenicians—it civilized them, and caused them to carry civilization further; and they stand out among the ancient semi-barbarous Arabs as a commonwealth of high culture. Respecting their religion, see ZABISM. Their language is supposed to have been a Semitic (Arabic) dialect, which, however, is almost entirely lost to us now. Some tablets with Himyaritic inscriptions have been found, but their readings are not quite satisfactorily fixed as yet. See SHEMITIC LANGUAGES, ARABIA.

SABBATH (Heb. *shabbath*, *sabbathon*, etc., from *shabath*, to rest; not from *shub*, to return, or *shebah*, seven) designates the seventh day of the week, set aside, in the Old Testament, as a period of cessation from work. Without entering into the question of its origin, i.e., whether it be an institution of pre-Mosaic times—either of "paradise" or of "heathenism"—or whether it be purely Mosaic, we shall merely state that, according to our only available source, the Pentateuch, the division of the week (q.v.) into seven days appears at a very early period; but the celebration of the seventh day as a day consecrated to Jehovah is first mentioned after the Exodus from Egypt, and seems to have preceded the Sinaitic legislation, which merely confirmed and invested it with the highest authority. On the occasion of the manna (Ex. xvi. 23), the Sabbath and its solemnity seem presupposed, and the "Remember the Sabbath-day" of the Decalogue further seems to indicate its previous institution. There is no trace of its celebration in the patriarchal times, although the Semitic traditions of the creation, and of the divine completion of it on that day, had undoubtedly marked it early as a special day of sanctity among the Abrahamites. The significance that was super-added to it after the Exodus, i.e., that of being a remembrance of the freedom from bondage, makes it appear likely enough that its first legal promulgation dates, as a Talmudical tradition has it, from Marah, where Moses "set them laws and rights" (Ex. xv. 25). While it thus on the one hand formed a sort of general human memento of the creation and the Creator of all things, as it is characterized in the first redaction of the commandments in Exodus, it became also, on the other hand, a national day of record of the bondage and the liberation from it, a notion prominently brought forward in the second recension of the Decalogue (q.v.) (Deut. v. 15), and the "rest" that was inculcated for everybody—kindred, strangers, slaves, even animals—received a double meaning. It is in the latter sense also denominated a sign between Jehovah and the generations of Israel (Ex. xxxi. 13): a kind of badge of nationality, a token of the covenant between Jehovah and Israel forever (Ex. xxxi. 16, cf. Ezek. xx. 12, Neh. ix. 13, etc.). It is constantly mentioned together with institutions of the same peculiar nature; such as reverencing the sanctuary (Lev. xix. 30), celebrating the feasts of a national character (Hos. ii. 11), keeping the ordinances (Ezek. xlv. 17), etc. And in like manner it was made one of the first obligations for proselytes, as one by which they were "taking hold of the covenant" (Is. lvi. 6). A few special cases only are furnished by the Pentateuch in explanation of the word "work" used in the prohibition—lighting a fire, gathering sticks, going out of the camp for the purpose of gathering manna. The violation of this law of rest was, as a crime of high treason against Jehovah, punishable with death; yet cessation from labor was only the negative part of the celebration of the day, which is called, like the other festivals, a "holy convocation." It is difficult to decide now what precise meaning is to be attached to these words, as referring to the early periods of Israelitish history, particularly before the institution of the prophets or sacred orators had been fully developed. It may be conjectured that the convocation was a kind of general religious assembly, in which readings and some kind of exposition of the law formed the principal features; and there is indeed a tradition to that effect recorded in the Talmud. Some, however, suppose that it was a festive meeting in honor of Jehovah, and refer to Neh. viii. 9–18 for proof that such a celebration was consistent with Jewish notions of keeping days holy to the Lord. As a further celebration of the day, a special burnt-offering, consisting of two lambs of the first year, with the corresponding meat and drink offering, besides the ordinary daily sacrifice, was instituted, and the shew-bread was renewed in the sanctuary.

Thus far the Pentateuch on the Sabbath. Turning to the later biblical books of the times before the exile, we find casual references to it as a day of rest and joy, exalted over the other days of the week, and on which agricultural labors and all things connected with them, such as carrying loads, selling and buying, etc., ceased. No deeper signification seems to have been attached to it yet. Although both Jeremiah and Ezekiel single it out especially, in common with monotheism and the laws of morality, yet they both rest satisfied with the inculcation of its outward observance, which seems occasionally to have fallen into entire disuse. With the return from the exile, however, a new phase was inaugurated. It is well known how energetically Nehemiah carried out his reformation, or rather the restoration of the primitive laws, as in other respects so with regard to the Sabbath; how he "testified" against those who were treading wine-presses on the Sabbath, and bringing in sheaves, and lading asses, etc., and further, against those "men of Tyre" who brought "all manner of ware, and sold on the Sabbath unto the children of Judah and in Jerusalem." It is by profaning the Sabbath, he urges, that their fathers have caused all the evil and wrath that befell the nation and the city. He had the gates shut from Friday evening to Saturday night, and drove away those merchants who still kept lodging outside, by threats of "laying hands on them."

What Nehemiah had reinstituted seems to have been most rigorously upheld, and in many cases made more binding even than he ever intended it, or, at all events, than the originally promulgated form of his words would seem to imply at first sight. With respect to the Sabbath in particular, we find it not more than 100 years afterward kept with such severity that the people would not even stir in defense of the city of Jerusalem, stormed by the soldiers of Ptolemy I. on that day. Later still, those who had fled into caves to escape the persecution of Antiochus Epiphanes allowed themselves to be butchered wholesale, nay, burned alive, without any attempt at flight or resistance; "because they made a conscience to help themselves for the honor of the most sacred day" (2 Macc. vi. 11). It was only in consequence of these horrible catastrophes, and in consideration of the probability of the enemy's always choosing the hallowed day for his attacks, and thus gradually rooting out the nation, that fighting in self-defense was allowed; although it appears the enemy was not to be disturbed in his siege works. Yet this relaxation in favor of the defensive appears again to have been abrogated through the influence of the fanatical Chassidaic party. Both Pompey and Herod, it would seem, took advantage of the Sabbath for the preparation of the storm on Jerusalem, relying—and successfully—on the strict observance of that day by their antagonists. The incessant tribulations, however, that followed almost without interruption till the final destruction of the Jewish empire, together with the influence of new schools and views, wrought an immense change. Shammai himself, the austere interpreter of the law, and the so-called antagonist of the milder Hillel, pronounced not only the defensive but the offensive legal and righteous (Sabb. xix. a): as, indeed, in his days, human life was placed, under all circumstances whatsoever, higher than any divine or human precept about the Sabbath. "The law," it is said with regard to the Sabbath, was given, according to the Scriptures, like other laws, "that man should *live by them," not that he should die through them*" (Tos. Shab. xvi. 5). That Joshua had never stopped in his sieges on the Sabbath was not considered so weighty an argument as the dire and imminent necessity that forced itself upon the military and spiritual leaders of the people, of preserving at all hazards a remnant at least of the fast perishing nation.

It was probably after the exile that the first attempts at legally fixing, or rather "fencing about," the divine ordinance in a minute and rigorous manner, were made. As we have seen before, no special definition of the "work" prohibited—save in a few instances—is to be found in the Old Testament. Whether it was the "men of the great synagogue," or the later schools, that promulgated the special precepts and prohibitions —part of which were traced to the legislation on Sinai itself (oral law)—is difficult to decide. The Mishna only enumerates thirty-nine principal ("*father-*") works, each of which, again, carries a certain number of minor ("*begotten*") works with it, which are strictly forbidden on the Sabbath. A certain portion of these inhibitions and prohibitions refers to work connected with agriculture and the chase; another to domestic labors generally performed by women (such as spinning, sewing, etc.); another again to trades (of builders, mechanics, laborers, etc.) and the like. One of the most harassing of precepts, and one which had at last to be amended by a number of new enactments, was the prohibition of moving things from one place into another (from public to private localities, and *vice versâ*). The minor prohibitions referred chiefly to things which might easily "lead" to the violation of the Sabbath, such as riding on horseback, climbing trees, etc. The "Sabbath-day's journey," or prohibition, based on Ex. xvi. 29, of walking more than the supposed utmost space between the ark and the extreme end of the camp, seems to belong, in the Mishnaic form at least, to the Roman times; the *mil* to which it was limited, and which contains the requisite 2,000 yards, being a Roman measure.

However it is to be reconciled with the well-known narrative of Christ's healing on the Sabbath-day, contained in the New Testament, there is absolutely no doubt about the fact that, according to the so-called Pharisaical code—i.e., the oral law, the highest and absolute authority of Judaism—the safety of life and limb utterly overrules not only the Sabbath, but even the day of Atonement itself. It is only certain smaller alleviations of momentary pain, such as could not by any chance place the patient in the slightest danger, about which we find some kind of casuistical discussions. Practically —that is, according to the final enactment (see Maimonides Yad Chasaka)—it is not only the regard to life, but to the health and well-being of the patient, that sets all Sabbatical prohibitions at nought. The law of "rest," according to the Talmud, applies no more to the case of the sick or those anyhow endangered, than it did with regard to the temple, and all the "work" therein, which, indeed, was much heavier on Sabbath and feast days than at other times. Another difficulty is found in the words in which Christ refers to the beast that is to be taken out of a pit on a Sabbath; the Jewish law ordaining, in reality, that it should be aided in its own efforts, if it endeavored to get out by itself; if it did not succeed, it should be left there, food being let down to it, until the end of the Sabbath (Luke xiv.; Matt. xii. 11; Sabb. 128 b). Could it be that the common people (the Hediots or Idiots—i. e., the untutored in the law) were ignorant of the real scope and purport of the "Pharisaical" code, and that the argument was directed against their crude notions, as directly opposed to the law as established?—But on this we must not enlarge here. It is also impossible to enter into any of the various ancient and modern ways of looking at the Sabbath in an allegorical and symbolical light, e.g., its being connected by Philo and his school with the planets, the spheres, the number seven, and the like mystical notions. Nor can we follow here those speculations which make out a close parallel between the divine work and rest and human work and rest; and show how well-rounded and entire time itself appears when shaped into a week after the model of the six days of creation, and how man's life is, through it, conformed to that of his Creator.

There can be no doubt about its meaning in the Old Testament. It is intended as a principal testimony of faith in the Creator of the universe. Hence its supreme importance. Though the threatened punishments for Sabbath-breakers never seem to have been carried out to the full during the times of the established commonwealth, in the scheme of Judaism it was placed on a par with the entire body of the law. He who transgresses the Sabbath is considered legally, according to Maimonides, as one who has set the whole law at defiance, and is to be looked upon in every respect as like a "worshiper of stars"—i.e., a heathen.

Regarding the development of the positive side of the Sabbatical observance, we have to mention first, that in conformity with the precept making it a day of "holy assembly," the synagogue (irrespective of the temple-service, its special sacrifices, prayers, and psalms for the day), assembled the faithful on that day within its precincts in every town and hamlet in and out of Palestine before and after the final exile. A certain portion of the Pentateuch, to which afterward was added a prophetical pericope, the Haftarah, was read, translated into the vernacular, and expounded homiletically. Special prayers and psalms, in addition to the ordinary slightly-modified service, with special reference to the sanctity of the Sabbath, were said and sung, and the rest of the day was devoted to pious meditation, study in the law, and to serenity and joyfulness. Respecting this last point, it must be borne in mind that the day is distinctly called a *day of joy and delight* (e.g., cf. Ps. xcii., Is. lviii. 13, Hos. ii. 11, 13, etc.—the words in Is. translated in the authorized version by "by doing thy pleasure," in reality mean "doing thy work;" the Hebrew word in this passage exactly corresponding to our "affairs," "business"). A variety of minor regulations referring to bodily indulgences on that day, abundantly prove—if further proof were needed—its recognized character as a "feast-day" in the natural and general sense of the term, in Judaism. It was to be honored by the wearing of finer garments, by three special meals of the best cheer the house could afford (fish, meat, etc.); and it was considered a particularly meritorious thing on the part of the master of the house to busy himself personally as much as possible with the furnishing of the viands, nay, the fetching of the very wood for the cooking, so as to do as much honor to the "bride Sabbath" as in him lay. Wine, if the means of the individual would anyhow allow it, was to crown the repast, special blessings being duly pronounced over it with reference to the holy day, both at its coming in and at its going out. From the circle of the family, this custom of welcoming, as it were, the Sabbath, and taking leave of it, with the cup of blessing, with lights, and with spice, found its way at an early period into the synagogue, on account of those strangers who, having to stop on their journey during the twenty-four hours, were often lodged and fed in or near the synagogue, and on whose behalf the blessing had to be pronounced generally. Fasting, mourning, mortification of all and every kind, even special supplicatory prayers, are strictly prohibited; but, on the contrary, the number of "a hundred benedictions," said at all varieties of enjoyments of the senses, are to be completed on the Sabbath, were it even by eating different kinds of fruit, smelling different spices, etc. Those who study hard during the week are to relax somewhat on that day, while those bent on business all week may indulge more freely in their readings; even school children are to be released from hard lessons on that day. Nay, the Friday itself participated in a manner in the solemnity of the Sabbath. Its very name was sunk in "eve of Sabbath." At an early hour in the afternoon trumpets were blown from the steps of the temple in Jerusalem; and certain shops, the stopping of whose business required some time, began to close. Again and again the trumpets resounded at certain intervals, and other trades ceased, as, indeed, nothing might even be begun on Friday which could not be finished or stopped at the end of that day: walking also was restricted to a certain extent on Friday, and judgment over life and death was entirely suspended. At last, when the sun disappeared from the horizon—irrespective of the situation of the place, whence a difference arose between the beginning of the Sabbath among the dwellers in valleys or on elevations—the hallowed period commenced, and lasted until three stars were visible in the following evening.

The original formulas, much enlarged in later times, as far as they are to be traced now, of the introductory benediction, as well as the valedictory prayer, both of which we subjoin, show the character and scope of the day in Judaism so fully, that they may stand instead of any further explanation of our own.

1. (Kiddush.) "Blessed art thou, O Lord, our God, king of the universe, who hath sanctified us by his laws, and hath made us participate in his grace, and hath, in his love and in his mercy, given us the Sabbath, as a remembrance of the creation, as the first day of holy convocations, and in memory of the redemption from Egypt; for thou hast chosen us and sanctified us from all peoples, and hast given unto us thy holy Sabbath in love and in grace. Blessed art thou, O Lord, who sanctifieth the Sabbath."

2. (Habdalah.) "Blessed art thou, O Lord, our God, king of the universe, who divided between holy and unholy, between light and darkness, between Israel and the peoples, between the Sabbath and the six days of creation. Blessed art thou, O Lord, who divideth between holy and unholy."

The same character of cheerfulness, of happy rest from the toil and turmoil of the world's business; of quiet and peaceful "return into one's self;" of joyous communion with friends and kindred over good cheer—in short, of mental and bodily relaxation and recreation that strengthens, braces, pacifies, and maketh the heart glad, while the sublime ideas which it symbolizes are recalled to the memory at every step and turn—seems to have prevailed at all times, down to our own, among the Jews. Whatever difference there may be in the peculiar customs respecting the Sabbath among some of the recent sects among them, e.g., the Karaites, the Chassidim, etc. (see JEWISH SECTS), they chiefly refer to the liturgy (with the one vital exception that the Karaites entirely abstain from the use of light and fire during the whole of the twenty-four hours), and to some minor points, upon which we cannot dwell here. It is also unnecessary here to go into the special "superior" or "mourning" Sabbaths during the year, i.e., those that precede or follow certain festivals or days of humiliation, or such as formerly inaugurated new academical semestres (Kallah), and the like. Suffice it to reiterate that in every class, every age, and every variety of Jews, from first to last, the Sabbath has been absolutely a day of joy and happiness, nay, of dancing, of singing, of eating and drinking, and of luxury.

The "luxus Sabbatarius" of Sidonius Apollinarius has indeed been a reproach to them, as was their supposed over-indulgence in laziness. The thinking minds were, according to Philo and others, more than ever busy on that day with those sacred mysteries of God's revelation to man and his miraculous workings on behalf of the "chosen" nation; others' hearts were lifted up by prayers, by readings, by earnest exhortations, and by pleasing and instructive homiletics. A dark, fanatical, self-torturing spirit is as foreign to the Jewish Sabbath (which is prolonged as far as possible) as it is foreign to the Mosaic and post-Mosaic legislation, its written and oral laws in general.

The benefits of the institution itself for the individual are, after what we have said of its practice, too self-evident to require further comment. How it connected, on the one hand, the human being with the divine Creator, and, on the other, with his fellow-creatures, brother and stranger, children and slaves, nay, the very beast of burden, the ox and the ass—how, ever recurring, it inculcated with irresistible force pious reverence, fear, and love of God, the sole master of all things—man's time and property included—good-will to all things created, and the absolute equality of all men—need not be urged here. Proudhon has recently treated on it from the national-economy point of view, and he has come to the conclusion that the proportion of the six days of work to the one of judicious rest is one of manifest wisdom, and of great blessing to man.

It is necessary here to say a few words with reference to the notion that the Sabbath, i.e., the celebration of the seventh day as a day of rest, is an institution common to all or most of the civilized nations of antiquity (Assyrians, Arabs, Egyptians, Greeks, Romans), from whom Moses has also been charged with having borrowed it. There is no more truth in these statements than there is in the often repeated assertion of an ancient Sabbath among the aboriginal savages. The dicta of Philo and Josephus, to the effect that there was no city, either Hellenic or barbarian, and not a single people, to which the custom of the Sabbath had not penetrated, have absurdly enough been taken by some as a proof that the Jews borrowed the custom. If the number seven [six and one] is one to which a peculiar significance attached at a very early period, in connection with the calendar (compare the seven worlds, the seven continents, the seven seas, etc., of the Indian cosmogony), and if the weekly cycle of seven days which goes back to the ante-Mosaic period (see Gen. xxix. 27, *seq.;* vii. 4, 10; viii. 10, 12, etc.), is, probably, the common property of the Semitic races; yet there is a mighty difference between counting time by seven (the ancient Egyptians had, in fact, a ten days' previous to a seven days' cycle), and making the seventh day a "day of rest and holy convocation," with reference to the national life of Israel. There is no special sanctity found attached to the day either with the Egyptians or with the pre-Mohammedan Arabs, who sacrificed on that day in black garments, in a hexagonal black temple, an old bull to Saturn: exactly as they sacrificed a boy on another day of the week, sacred to the planet Jupiter. As for the Greeks, the only authenticated passage we find with reference to the subject, is Hesiod's (*Op. et D.* 770, etc.) reference to the seventh day of the month, sacred to Apollo as other days were sacred to other gods. Other verses quoted by Clemens Alexandrinus and Eusebius, as from Homer and Hesiod, are proved to be spurious Judæo-Hellenic fabrications. The Roman calendar knows absolutely nothing of a hallowed seventh day.

Thus much on the Sabbath under the "old dispensation." We have still to consider it in relation to the Christian church, and to trace the progress of opinion and practice in regard to the observance of the first day of the week, which in this country is frequently styled the Sabbath, or, more definitely, the Christian Sabbath.

It is hardly necessary to observe, that all the discourses of Jesus were addressed to Jewish hearers, subject, like himself to the Mosaic law. That he is nowhere recorded to have enjoined the observance of the Sabbath has by some been thought significant, but seems to have been natural enough in a case where those he addressed, so far from neglecting the duty, were superstitiously scrupulous in its performance. What his hearers needed and received was the lesson that, the Sabbath having been intended for human benefit, the duty of observing it ought to give way before the higher duty of effecting that purpose, when the two were in conflict; and that trivial acts demanding no exertion were not to be confounded with that real and exhausting labor which was the thing truly forbidden. (Matt. xii. 1–14; Mark ii. 23–28; iii. 1–6; Luke vi. 6–11: cf. Hosea vi. 6; Psal. l. 8–14; li. 16, 17; Is. i. 10–17; Jer. vi. 19, 20; vii. 21–22; 1 Sam. xxi. 6.) Some have thought that by making clay on a Sabbath to anoint the eyes of a blind man, and by ordering an invalid, when cured, to carry home his bed on another Sabbath, he designed to intimate, if not the present abolition of the Sabbath, at least its approaching end. But others look upon the former of these acts as much too trivial to be confounded with "servile work," and the latter as an exceptional case within the scope of the principle above stated. On no occasion does he appear to have sanctioned the performance of real work on the seventh day, unless it was demanded by some higher duty than that of bodily rest.

For several years after the death of Jesus the church included none but Jews, and by these the Sabbath and other Mosiac rites continued to be observed as before. It was not till Peter's visit to the centurian Cornelius (41 A.D.) that the gospel began to be preached to the Gentiles; and when the apostles and elders met at Jerusalem to consider what was to be done with the Gentile brethren, it was decided that no Mosaic burden should be laid upon them beyond abstinence from certain practices, of which working on the Sabbath is not one (Acts xv. 23–29). Nevertheless, the Judaizing party continued in various places to demand more or less conformity to the law on the part of the Gentile converts. This party was strenuously withstood by Paul (q.v.), in whose epistles the dispute is a subject that frequently recurs. From his letters to the churches of Rome, Galatia, and Colosse, which contained both Jews and Gentiles, we learn that, while the Jews wished the Gentiles to observe the Sabbaths prescribed in the law, the Gentiles were prone to treat the observance of Jewish ceremonies with contempt. Upon both parties the apostle enjoins mutual forbearance and respect; forbidding the Jew, who esteemed one day above another, to disturb the Gentile, who esteemed every day alike, and ordering the Gentile to refrain from contemning the observances conscientiously performed by his weaker brother the Jew (Rom. xiv.; Col. ii. 11–17). That he never taught the Jewish Christians to abandon the observance of the law, but, on the contrary, continued to the end to observe it himself—as appears from Acts xxv. 8, xxviii. 17; Philip, iii. 6—are facts of which different explanations have been given by theologians; some thinking that the law continued binding on the Jews, whether Christians or not, so long as the temple stood; while most are of opinion that conformity to the rooted notions and habits of that people was tolerated for a time, in order that the diffusion of the gospel might not be impeded among them. In the eastern churches, where the proportion of Jews was greater than in the west, the Sabbath continued to be observed till the 5th c., when we lose sight of the Ebionites (q.v.) a sect of Judaizers such as Paul withstood—and of the more moderate Ebionitic Nazarenes, who, though they conceived it to be their *own* duty to circumcise, keep the Sabbath, etc., had no desire to impose the peculiarities of Judaism on the Gentile Christians. Down to the present time, however, Sabbath-keeping and various other Jewish rites continue to be practiced along with Christian observances by the Christians of Abyssinia, whose ancestors, it is probable, derived them either (as a tradition among them indicates) from missionaries of the Alexandrian church, of which many members were Jews, or from expatriated Hebrews who settled in Abyssinia at some much earlier date. In other countries, also, many of the Gentile Christians seem to have anciently observed the Sabbath, if not by resting the whole day from work, at least by attending on it the religious meetings of their sabbatizing Jewish brethren.

Hitherto we have spoken of the observance of *Saturday*, the day of rest prescribed to the Jews, and to which exclusively the name of the Sabbath day was anciently applied, and still continues to be given by every nation but our own and its offshoots. At what date the Sunday or first day of the week began to be generally used by Christians as a stated time for religious meetings, we have no definite information either in the New Testament or in the writings of the fathers of the church (q.v.). By none of the fathers before the 4th c. is it identified with the Sabbath, nor is the duty of observing it grounded by them either on the fourth commandment, or on the precept or example of Jesus or his apostles, or on an ante-Mosaic Sabbath law promulgated to mankind at the creation and continuing in force after the coming of Christ. To the reality of such a law—which many modern Christians have deduced from Gen. ii. 2, 3; iv. 3; vii. 4, 10; viii. 4, 10–12; xxix. 27; l. 10; Ex. xvi. 4–30, and which some (as bishop Horsley, Serm. 22) regard as an indispensable basis for a Christian Sabbath—it has been objected that the attention of the Gentile converts, who must be supposed to have been ignorant of the law in question, is nowhere found in Scripture to have been directed to it by Paul; that his declarations of their freedom from the observance of days are so general as to apply to every law on that subject, whensoever enacted; that consequently he must either have been unacquainted with a primeval law, or (if not) have regarded it as obsolete under the new dispensation; and lastly, that the fathers, had they known such a law, would have mentioned it in their writings, instead of vindicating (as Justin, for instance, does in his *Dialogue with Trypho the Jew*) the neglect of Sabbath-keeping by Gentile Christians, on the ground that the Sabbath began with Moses and was not observed by the patriarchs. By none of the fathers is any Sabbath-law whatever represented as being in force among the Gentiles.

On what grounds, then, did the Christians observe the first day of the week as a time for religious assemblies?—and how and when did the custom of so distinguishing it begin? To these questions very different answers have been given. According to some theologians apostolic precept or example is the only conceivable origin of a custom apparently so general as well as early; and of such *example*, at least, they find evidence in John xx. 19, 26; Acts ii. 1; xx. 6, 7; 1 Cor. xvi. 1, 2; and Rev. i. 10. But others, doubting or denying the conclusiveness of this scriptural proof, conceive that an adequate explanation may be found in the circumstances of the primitive church. That the desire which naturally actuates the members of every new and unpopular religious sect to meet frequently for worship, instruction, and mutual encouragement might very soon lead to the fixing of stated days for that purpose, may be assumed as self-evident; that a weekly day should be chosen would be a natural result of the Jewish habits of the earliest Christians; and that the day on which their Lord had risen victorious from the grave should be thought fittest for this weekly festival is precisely what was to be expected in their circumstances. But the resurrection of Jesus is by no means the only reason assigned by the fathers for the honor which they paid to the Sunday. By Justin (see JUSTINUS), in whose *Apology for the Christians to Antoninus Pius*, ss. 87–89, written between 138 and 150 A.D., the earliest undoubted mention of Sunday meetings in the works of the fathers occurs, several reasons for holding them *then* are assigned—the first being that on this day of the week the world and light were created; and the second being the resurrection of Christ. "We, all of us," says he, "assemble together on Sunday, because it is the first day in which God changed darkness and matter, and made the world. On the same day, also, Jesus Christ our Saviour rose from the dead; for he was crucified on the day before that of Saturn; and on the day after that of Saturn, which is that of the sun, he appeared to his apostles and disciples, and taught them what we now submit to your consideration." To these reasons, Origen (*Seventh Hom. on Exod.*) adds the fact that manna was first given to the Israelites on a Sunday; while subsequent writers adduce various other events, either recorded, or by them imagined to have occurred on that day. In arguing with Trypho, Justin opposes Sabbath-keeping by Christians, on grounds which would have been retorted by the Jew as condemning equally the observance of a first-day Sabbath, had the Sunday at that time been regarded as the Sabbath: from which fact and the circumstance that in his *Apology* already spoken of, where he professes to give the emperor Antoninus a full account of the observance of the day, no mention is made of rest from labor as a part of that observance, the inference has been drawn that, except during the time of divine service, the Christians in this father's age thought it lawful to follow, and actually did follow, their wordly pursuits on the Sunday. It is true that by Tertullian, who wrote in the latter half of the 2d c., the Christians are described as "putting off even their business on the Lord's day, lest they might give place to the devil" (*De Orat.* c. 23); an indication, in Neander's opinion (*Church Hist.* i. 409, Bohn's ed.), that now the Jewish law of the Sabbath had begun to be applied to the Lord's day. But the soundness of this interpretation has been questioned—Dr. Hessey, for instance (*Bampton Lectures*, 1860, p. 68), stating that he can find in it "nothing Sabbatarian—nothing, in fact, more than I should have expected, considering that the church had now become somewhat settled—that, rather than that the duties peculiar to the Lord's day should be neglected, wordly business was put off to another day." But whatever may have been the opinion and practice of these early Christians in regard to cessation from labor on the Sunday, unquestionably the first law, either ecclesiastical or civil, by which the sabbatical observance of that day is known to have been ordained, is the edict of Constantine, 321 A.D., of which the following is a translation: "Let all judges, inhabitants of the cities, and artificers rest on the venerable Sunday. But in the country husbandmen may freely and lawfully apply to the business of agriculture; since it often happens that the sowing of corn and planting of vines cannot be so advantageously performed on any other day; lest, by neglecting the opportunity, they should lose the benefits which the divine bounty bestows on us" (*Cod.* iii. 12, 3). Before this time, such of the Christian writers as had endeavored, by a mystical style of interpretation, to turn the Mosaic ceremonies to account as sources of moral and religious instruction, had, probably in imitation of Philo (q.v.) (*Works*, iii. 265, Bohn's ed.), spiritualized the law of the Sabbath to the effect of representing it as a mystical prohibition to the Christian of evil works during all the days of his life, and a prefiguration of the spiritual repose and enjoyment which is his portion both in this world and in the next. But in addition to this significance, there now began to be discovered in the Old Testament, foreshadowings of the new Sunday-Sabbath; and Eusebius (q.v.), bishop of Cæsarea, the friend and biographer of Constantine, was able to descry in Ps. xlvi. 5, and lix. 16, prophetic allusions to the *morning* assemblies of Christians on Sundays for worship, and in Psal. xxii. 29, a prefiguration of the weekly celebration of *the Lord's-supper* on that day. Applying Ps. xcii. to the first day of the week, the same writer says that "the word, by the new covenant, translated and transferred the feast of the Sabbath to the morning light, and gave us the symbol of true rest—viz., the saving Lord's day, the first of the light," etc. From other passages in Eusebius and subsequent writers, it is plain that they meant, not that this transference had been formally ordained by Christ (of which there is no trace in Scripture), but that by rising from the tomb on the first day of the week he had made that day more illustrious than the Sabbath, and more worthy to be celebrated by the holding of Christian assemblies for worship than the Sabbath was to be similarly honored by the Jews. About the end of the 4th c. Chrysostom is found similarly expounding Gen. ii. 3, which, in his opinion, shows that already from the beginning God offered us instruction typically, teaching us to dedicate and separate the one day in the circle of the week wholly to employment in things spiritual—thus (as his translator observes) making the Sabbath a *type* of the Lord's day, and rest *from* bodily, of rest *in* spiritual work. (*Library of the Fathers*, ix. 209.)

It was a natural result of Constantine's law, backed by such interpretations of the Old Testament as these, that in the words of Dr. Hessey, "a new era in the history of the Lord's day now commenced; tendencies toward sabbatarianism or confusion of the Christian with the Jewish institution beginning to manifest themselves. These, however, were slight until the end of the 5th c., and are traceable chiefly to and in the civil legislation of the period. Afterward they developed themselves more decidedly; sabbatarianism became at length systematized, in one of its phases, in the ante-reformation church both in England and on the continent by the later schoolmen, probably in their desire to lay down exact rules for consciences, and under a fancied necessity of urging the precedent of Jewish enactments in support of Christian holy-days" (p. 20). But it was not till the year 538 that abstinence from agricultural labor on Sunday was recommended, rather than enjoined, by an ecclesiastical authority (the third council of Orleans), and this expressly "that the people might have more leisure to go to church and say their prayers;" nor was it till about the end of the 9th c. that the emperor Leo, "the philosopher," repealed the exemption which it enjoyed under the edict of Constantine (Leo. *Const.* 54). And now the Lord's Day being thoroughly established by law as a Sabbath, the fourth commandment would more than ever be employed by the clergy as a means of persuading to its observance. The entire decalogue, indeed, has long been used by them as a convenient summary of human duty; and by the later schoolmen it came to be represented as, to a certain extent—i.e., so far as it coincided with the law of nature —actually *obligatory* on Christians. This theory of its binding force and the notion of the holiness of days were vigorously opposed by Luther and the other reformers, who denounced also the excessive multiplication of festivals, and proclaimed that the pardon of sin was not to be secured by their observance, or otherwise than by faith in Christ. (See Luther's *Larger Catechism;* the *Augsburg Confession*, 1530, c. vii.; Calvin's *Institutes*, b. ii. ch. viii. ss. 28–34; and his other writings on the subject, collected by R. Cox in *The Whole Doctrine of Calvin about the Sabbath and the Lord's Day*, Edin. 1860). But while condemning everything which they viewed as abuses and corruptions, the reformers never ceased to acknowledge the manifold utility and high importance of the Sunday as a day of rest, worship, and decorous enjoyment. Like the later fathers and the schoolmen also, they recognized in the fourth commandment a useful means of instruction and exhortation; but, as we have said, they utterly rejected it as a law. "The ten commandments," says Luther, "do not apply to us Gentiles and Christians, but only to the Jews." (*On the Ten Commandments*). "A law," says Grotius, "obliges only those to whom it is given; and to whom the Mosaic law is given, itself declares: 'Hear, O Israel.'" (*De Jure Belli et Pacis*, lib. i. c. i. s. 16). He quotes also Deut. iv. 7, and Ps. cxlvii. 19, 20. This is not antinomianism (q.v.): the reformers acknowledged their subjection not only to the more perfect law of Christ, but to that universal and perpetual law which Paul (Rom. ii. 14) speaks of as the light to the Gentiles of old, who, "not having the law, were a law unto themselves, showing the work of the law written in their hearts." See ETHICS.

The distinction, however, between Moses as a lawgiver and Moses as a teacher, was one very apt to be overlooked by the multitude and disregarded in popular discourses by the clergy themselves. In England where the writings of the reformers were less studied than in Germany, the response after the fourth commandment in the liturgy (where the decalogue, adapted to general use by the omission of the words addressing it to the Jews, was inserted in 1552), "Lord, have mercy upon us, and incline our hearts to keep *this law*," must have greatly tended to instil the belief that this commandment imposed on them the duty of keeping, not a mystical, but a literal Sabbath. Accordingly, in the reign of Elizabeth it occurred to many conscientious and independent thinkers (as it had previously done to some Protestants in Bohemia), that the fourth commandment required of them the observance, not of the first, but of the specified *seventh* day of the week, and a strict bodily rest as a service then due to God; while others, though convinced that the day had been altered by divine authority, took up the same opinion as to the Scriptural obligation to refrain from work. The former class became numerous enough to make a considerable figure for more than a century in England under the title of "sabbatarians" —a word now exchanged for the less ambiguous appellation of "seventh-day Baptists." The other and much larger class were the Puritans (q.v.), who, justly offended by the vices and frivolity of the times, but also soured by persecution, applying to themselves the threats of Jehovah against the profaners of the token of the covenant between him and his chosen people—led astray by the mistranslation of Is. lviii. 13 above noticed—overlooking the incidents in Luke xiv. 1–12—and giving a narrower scope than the reformers had done to the teaching of Paul—added to Sunday-keeping an austerity by which neither it nor the Sabbath-keeping of the Jews had ever before been marked. (See ASCETICISM). This great party, when predominant for a time in the reign of Charles I., availed themselves of the opportunity to maintain and spread their sabbatarian opinions, not only in numerous treatises, but through what has proved to be the more lasting and influential means of the *Westminster Confession* and *Catechisms*. (See ASSEMBLY OF DIVINES; CATECHISMS; CREEDS AND CONFESSIONS). Chiefly through these formularies was effectually introduced into Scotland that scrupulous abstinence from recreation as well as business on Sunday which still distinguishes the people. For it is a mistake to suppose that either sabbatarianism or asceticism was recommended by Knox. Agreeing with the other reformers, Knox, in setting forth in his *Confession of Faith* (1560) "the works of the first table," says not a word about the Sabbath. This *Confession* and the *Geneva Catechism* were adhered to in Scotland till superseded in 1648 by the Westminster standards of faith. Nor is it only to the British Presbyterians that the opinions and habits of the Puritans have descended; as the colonists of New England they planted in that distant soil the rigid sabbatarianism which still survives in Massachusetts and Connecticut, and retains the Jewish peculiarity (which found its chief advocates in Prynne and Shepard, 1655) of being observed from sunset to sunset. In

America, too, exists now the principal remnant of the seventh-day Baptists. (See Rupp's *Relig. Denom. in the United States*, pp. 70–111; Mrs. Davis's *History of the Sabbatarian Churches*, Philad. 1851; and the publications of the American (seventh-day) Sabbath tract society, New York, 1852, etc.). They have nearly disappeared in England, though in the 17th c. so numerous and active as to have called forth replies from bishop White Warren, Baxter, Bunyan, Wallis, and others.

In Holland, though some English Puritan settlers gave birth to a controversy which, during the greater part of the 17th c., engaged the pens of many of the most eminent divines (among whom were Gomarus, Walæus, Rivetus, Cocceius, and F. Burmann), the principles of the reformers, favored by Grotius among the laity, ultimately kept their ground, as they have done also in Protestant Germany. Yet in Holland were produced the two bulkiest defenses of Sabbatarianism that have ever been published—one, in Latin, by John Brown, an expatriated Scotchman who had been minister of Wamphray, entitled *Causa Dei contra Anti-Sabbatarios* (2 vols., Rotter. 1674–76); and the other, in Dutch, by his friend James Koelman, on *The Controversy, History, and Manner of Observance of the Sabbath and the Lord's Day* (Amst. 1685).

In England the earliest considerable treatise on the Puritan side was the *Sabbathum Veteris et Novi Testamenti* of Dr. Nicholas Bound, a minister in Suffolk (Lond. 1595; 2d ed. 1606). It is written in English, though the title is partly Latin. Many converts were made by it and the similar works of Greenham and Widley, his contemporaries; but till the heterodoxy of the Seventh-day Baptist Brabourne aroused, in 1632, the indignation of the bishops, little noise seems to have been made throughout the nation by the controversy; nor would it, perhaps, have ever attained prominence, had not Charles I. committed, in 1633, the blunder, and, as the Puritans believed, the gross impiety, of reviving his father's *Declaration concerning Lawful Sports to be used* [*on Sundays*]. (See SPORTS, BOOK OF.) This the clergy were required by Laud (q.v.) to publish in their churches, and many who refused were punished severely. Hence arose the greatest English controversy about the Sabbath, between the high-church party on the one hand, and the Puritans on the other. Bishop White (*Treatise of the Sabbath Day*, 1635) and Dr. Heylin (q.v.) (*History of the Sabbath*, 1636) took the lead for the former, and were ably supported by Sanderson (*A Sovereign Antidote against Sabbatarian Errors*, 1636), Ironsides (*Seven Questions of the Sabbath briefly Disputed*, 1637), Taylor (*Holy Living*, ch. iv. s. 6, and *Ductor Dubitantium*, b. ii. ch. ii. rule 6, ss. 43–62), and Bramhall (*On the Controversies about the Sabbath and the Lord's Day*, in his *Works*, fol. p. 907). On the Puritan side were Henry Burton (*The Lord's Day the Sabbath Day*, 1636), John Ley (*Sunday a Sabbath*, 1641), Hamon L'Estrange (*God's Sabbath before the Law, under the Law, and under the Gospel*, 1641), Richard Bernard (*A Threefold Treatise of the Sabbath*, 1641), William Twisse, prolocutor of the Westminster assembly (*Of the Morality of the Fourth Commandment, as still in force to bind Christians*, 1641), and jointly Cawdrey and Palmer, two members of the same assembly, in their *Sabbatum Redivivum, or the Christian Sabbath Vindicated* (2 vols. 1645–52), which is the most elaborate defense of Sabbatarianism in our language. A still more eminent writer on that side, and one of greater breadth of view, was Dr. John Owen, whose *Exercitations concerning a Day of Sacred Rest* (1671), since prefixed to his *Exposition of Hebrews*, gave, however, some offense to his friends by suggesting that the duration of the religious exercises of the day should be measured by the strength of the worshiper. Since then, the Sabbatarian cause has been maintained by numberless writers, among whom may be mentioned bishop Hopkins, Willison, Jonathan Edwards, Dwight, Stopford, Macfarlan, and others to be afterward named; while the opposite side is supported by Baxter, Milton, Barrow, Barclay, Morer, Michaelis, Paley, Evanson, Higgins, etc.

In the first half of the reign of George III., the comparative neglect into which the observance of the Lord's day had fallen in England aroused the anxiety of its friends, and many efforts were made to bring the people to a better disposition toward it. Paley did excellent service, especially by his chapter on the use of Sabbatical institutions (*Moral Philosophy*, b. v. ch. vi.); while bishop Porteus successfully exerted himself to check open indulgence in vicious and unseemly amusements. About the same time the new "evangelical" (q.v.) party began those efforts which it makes for the promotion of a strict observance of Sunday according to the Puritan model. But what, perhaps, had most effect in turning the current of public opinion in that direction was the substitution of the decade (see DECA) for the week, and the abolition of public worship, by the national convention of France in 1793 (see CALENDAR); proceedings which brought to the aid of the pious advocates of the Lord's day the political conservatism and anti-Gallican feelings of the British people. In the next generation, the revival of the study of ancient Christian literature led to fresh advocacy of the Lutheran views concerning the Sabbath and the Lord's day, by bishop Kaye (*On Justin Martyr*, 1829), Dr. Whately (*Thoughts on the Sabbath*, 1830), Mr. Bannerman (*The Modern Sabbath Examined*, 1832), and the Oxford "Tractarians;" while Sabbatarianism had influential advocates in bishop Mant (*The Christian Sabbath, its Institution and Obligation*, 1830), Dr. Daniel Wilson, afterward bishop of Calcutta (*The Divine Authority and Perpetual Obligation of the Lord's Day Asserted*, 1830), and Dr. Ralph Wardlaw (*Discourses on the Sabbath*, 1832)—in support of whose principles was founded in 1831 the London "society for promoting the due observance of the Lord's day," which, aided by similar associations in Scotland and the United States, still keeps a jealous watch on behalf of the institution. For 17 years preceding his death in 1849, its most noted member, sir Andrew Agnew, M.P. for Wigtownshire, sought indefatigably both in and out of the house of commons for a stricter legal enforcement of rest on Sunday; and though he failed to get his bill passed, the agitation which he headed was not wholly fruitless. The attempts, however, which he and his friends have made to suppress all post-office action on Sunday, all stated conveyance of passengers on railways, and such recreations as walking in public gardens, listening to music in the London parks, and viewing works of nature and art in the national collections, have seemed, even to many friends of the institution, to display more zeal than wisdom or knowledge, and have led to the formation (in 1855) of "the national Sunday league"—a society which, while deprecating the conversion of any part of the day into a season for ordinary labor, or for frivolous or vicious amusement, conceives that a more cheerful mode of spending some of its hours is expedient, and that the opening of public gardens, museums, and galleries of art, would promote alike the health and the moral and intellectual elevation of the people.

In France, where the week was restored by Napoleon I. in 1806, the Sunday has not yet wholly recovered its former status as a day of rest; but efforts have lately been made by both clergymen and laymen to convince the people of the advantage of suspending all but necessary labor upon it. Among the advocates of this reform are Pérennès, Gaume, and Mullois, who, however, discountenance the austerity of the Puritans. In Switzerland, Mellet, the pastor of Yvorne, is the author of a clever treatise on *Sunday and the Sabbath*, of which there is an English translation (Lond. 1856). Bred a Sabbatarian, he was converted to the Dominical view by reading Dwight's Sabbatarian *Discourse on the Perpetuity of the Sabbath*, a doctrine still upheld by the "evangelical" party in Switzerland.

Of late years the bearing of geological discovery on the interpretation of the Hebrew narrative of the creation, and consequently on the Sabbath controversy, and, in particular, on questions arising out of the discrepance between the two copies of the fourth commandment, has been largely discussed. See GENESIS; DECALOGUE. Into the merits of this and other disputed points it is impossible to enter here; but, in concluding the present historical sketch, it may be allowable to express the satisfaction with which we observe that, notwithstanding the wide diversity of opinion as to the authority of the Lord's day and the manner in which it may and ought to be spent, almost all agree in esteeming it highly as a civil institution at least, and in wishing to defend it from the intrusion of business as far as the public good will allow.—For additional information and discussion, see (on the Sabbatarian side) Holden's *Christian Sabbath* (Lond. 1825); *Report from the Select Committee of the House of Commons on the Obs. of the Sabbath-day* (sir A. Agnew's committee), Aug. 6, 1832; Jordan's *Scriptural Views of the Sabbath of God* (Lond. 1848); M'Crie's *Memoirs of Sir A. Agnew* (Edin. 1850); Pirret's *Ethics of the Sabbath* (Edin. 1855); Fairbairn's *Typology of Scripture* (3d ed. Edin. 1857); J. Gilfillan's *Sabbath Viewed in the Light of Reason, Revelation, and History, with Sketches of its Literature* (Edin. 1861): and (on the Dominical side) Arnold's *Sermon's*, vol. iii. (Lond. 1844), and his *Life* by Stanley, 5th ed. vol. i. p. 864, and vol. ii. p. 206; Neale's *Feasts and Fasts* (Lond. 1845); sir W. Domville's *Examination of the Six Texts commonly adduced from the New Testament in Proof of a Christian Sabbath* (Lond. 1849); Hengstenberg on *The Lord's Day*, translated by J. Martin (Lond. 1853); F. D. Maurice's *Sermons on the Sabbath-day* (Lond. 1853); R. Cox's *Sabbath Laws and Duties* (Edin. 1853); Domville's *Inquiry into the supposed Obligation of the Sabbaths of the Old Testament* (Lond. 1855); *Sunday the Rest from Labor*, by a Christian (Lond. 1856); Dr. W. F. Hook on *The Lord's Day* (Lond. 1856); *Time and Faith* (Lond. 1856); Alford's *Greek Testament with Commentary* (Lond. 1856–61); F. W. Robertson's *Sermons*, 1st and 2d series (Lond. 1856); Baden Powell's *Christianity without Judaism* (Lond. 1857); Reichel's *Lord's Day not the Sabbath* (Dubl. 1859); W. Logan Fisher's *Hist. of the Institution of the Sabbath-day, its Uses and Abuses*, 2d ed. (Phila. 1859); Dr. J. A. Hessey's *Sunday; its Origin, History, and present Obligation*, being the Bampton lectures for 1860; and the *Edin. Review* for Oct., 1861, p. 535. Of the British Seventh-day Baptists the principal works are those of Brabourne (1632), F. Bampfield (1677), Cornthwaite (1740), and Burnside (1825). The Roman Catholic doctrine respecting the Lord's day is amply stated in *The Catechism of the Council of Trent* (1567), Part III., pp. 351–357, 391–403 of the English transl. (Lond. 1852). As to all shades of opinion, see R. Cox's *Literature of the Sabbath Question* (2 vols. Edin. 1865). Proudhon's work, above referred to, is entitled *De la Célébration du Dimanche Considérée sous les Rapports de l'Hygiène Publique, de la Morale, des Relations de Famille et de Cité* (Paris, 1850).

SABBATHAIS ZWI, one of the most remarkable "messiahs" of modern times, the founder of a wide-spread sect of semi-Christians and semi-Jews throughout Europe, Asia, and Africa, was b. at Smyrna in 1641. A boy of extraordinary gifts, he had at the age of 15 already mastered the Talmud, and at 18 was an adept in the mysteries of the Cabbala. Very soon, incited by fantastic dreams and more fantastic friends, he declared himself to be the Messiah, who had been sent to shake off the thralldom both of Christianity and Mohammedanism from the Jews, and to convert all humanity. The supreme rabbinical council thereupon excommunicated him. He, however, continued to preach his "mission" as before. He was now declared an outlaw, and his death was decreed, yet nobody dared to touch him. At last his expulsion from Smyrna was resolved upon by the municipal authorities. Four apostles—one of them a reconverted Jew, who had previously turned Christian—followed him on his way to Saloniki, where he arrived in 1659, having gathered a vast number of disciples, mostly wealthy, on his road. His extraordinary personal beauty and his fiery eloquence soon brought the most influential Jewish inhabitants on his side, and his cabbalistic formulas and prayers were adopted into the ritual of their synagogue. Two years later, however, he had to leave Saloniki, where powerful antagonists had risen in the mean time, and went first to Palestine and soon after to Alexandria, accompanied by several thousand disciples. Here his power and influence grew so rapidly that the revenues of the commonwealth to be founded by the new messiah, and the ways and means of supporting the wars he was going to wage, were seriously taken into consideration. In 1664 no fewer than about 80,000 people belonged to the new empire: and in the following year the beginning of the messianic reign within a few months, and the rebuilding of the temple in the next year, were proclaimed aloud in the streets of Alexandria by Sabbathais and six disciples, all clad in white raiments, with garlands on their heads. Somewhat later he returned to Jerusalem; and the resurrection, to take place within six years, and the deposition of the sultan, whose crown would be placed upon Sabbathais's head, were proclaimed far and near. Upon this all the Jews of Asia, Africa, and Europe were divided into two camps. Those who believed, finding all the predicted signs fulfilled now, sold everything they had in order to get ready money for their journey to and final abode in the new capital, Jerusalem; others, and among them some of the highest spiritual authorities, declared all the pretended messiah's miracles to be cabbalistic tricks, and himself an impostor. Returned to his native place, Smyrna, he was received with full royal honors. Meanwhile the attention of the divan was drawn to this movement, and Mohammed IV., then in Adrianople, ordered the grand vizier to secure the person of Sabbathais, and to commit him to prison, until the investigations set on foot should be concluded. Two agas, however, returned with their janizaries, without having effected the order, not having dared "to stretch forth their hand against the sacred man." He now offered to surrender voluntarily. He was committed as prisoner of state to Kuthajah, where he received visits and deputations from all parts. Being at last brought before the sultan, his courage failed him, and he declared himself to be nothing more than a simple rabbi: it was only his disciples, he averred, who had called him a messiah. The sultan then proposed to test his "mission." Three poisoned arrows were to be shot at him. Did these prove harmless, he, the sultan, would at once range himself under his flag. In speechless terror, Sabbathais, at the instigation of his Jewish interpreter, now took the turban from the head of some official, and placed it upon his own, thereby indicating, as the interpreter declared, that his sole object had been all along to embrace Islam, and to carry over all the Jews with him. The sultan declared himself satisfied, and honored him with the title of an effendi, giving him an honorary post at the same time.

But, extraordinarily enough, the movement was far from having reached its end. The most wonderful stories were circulated among the believers. A fictitious man was supposed by some to have embraced Islam, while the real Messiah had ascended heavenward. Others believed that Islam was to form part of the new religion; and Sabbathais, countenancing this view, converted many Jews to Mohammedanism. Nathan, one of his most enthusiastic disciples, traveled about, and caused strife without end, even sanguinary revolts. Many, however, had turned from him by this time, and the voices of the rabbis and their excommunications began to tell more forcibly. Finally, the grand vizier was persuaded to imprison Sabbathais once more, and to send him to Bosnia, where he died in a prison in Belgrade—according to some, in consequence of poison, while according to others he was executed in 1677, ten years after his conversion. It is very difficult to judge correctly of a character like his. Even his worst enemies never had a word to say either against his morality or against the extraordinarily brilliant powers of his mind, and his erudition. Probably, he was a self-deceiver, whose plans were not measured by the means in his hands for their execution. His death, however, was only the signal for the re-enforcement of his sect, which even many of his former antagonists now joined, and which now, for the first time, was developed into a proper religious system—that of the Sabbathaites or Sabbathians (Shebsen), the chief apostles being Nehemiah, previously a bitter enemy of Sabbathais (1677–90), and Nehemiah Hajun (1708–17). The latter taught the dogma of the Trinity as part of the new faith; and it became a principle of this religion to accept and to modify itself to the dominant creed of the country—Islam in the east, Christianity in the west. Remnants of it are still in existence in Poland and Turkey. See JEWISH SECTS.

SABBA'TIA, a genus of plants, of the natural order *gentianaceæ*, natives of North America. They are small herbaceous plants, some with simple, and some with branched stems. They all contain, like many others of the same order, a pure bitter principle, on account of which they are useful in intermittent fevers and as a tonic. They are much employed in the United States.

SABBATI'CAL YEAR (Heb. *Shenath, Shabathon, Shebiith, Shemittah;* Gr. *Hebdomatikos* or *Sabbatikos eniautos*). There are four special injunctions found respecting the celebration of it in the Pentateuch. The first (Exod. xxiii. 10, *seq.*) ordains that the land, after being sown, and its fruits reaped for six years, should be left to itself in the seventh, so that the poor, and the beasts of the field should eat its spontaneous growth. The same is to be the case with the vine and olive-yards. The second (Lev. xxv. 2–7) views the hallowed period as a "Sabbath of rest unto the land"—as a solemnity in honor of Jehovah. It is there further enjoined that the growth of the seventh year be "meat" both for proprietor, servants, and strangers; that, in fact, it should be common property. A somewhat new significance, but strictly analogous to the first-named ordinance, is given to the institution in the third passage (Deut. xv. 1–11), in which the creditor is enjoined to release the debts owing to him by his poor brother and neighbor. It has been matter of much dispute whether this "release" implies the entire giving up of the debt, or a mere respite. The Mishna decides in favor of the former; and such were the effects of the law, carried out in accordance with this view, that it was found necessary utterly to paralyze it by an act called the *prosbul* (Gr. prosboulé), passed by Hillel the great. The fourth passage (Deut. xxxi. 10–13) contains the command to read in the solemnity of the year of release in the "feast of tabernacles," the law before all the people in holy convocation, men, women, children, and strangers. We need only remark here that the fundamental idea of the sabbatical year is identical with that of the weekly Sabbath itself; see also JUBILEE, the highest exaltation, as it were, of the idea of sabbatical rest. As to the practical working of the institution, we learn that it gave rise repeatedly to famine (1 Macc. vi. 49, 53; Jos. *Ant.* xiv. 16, 2, etc.), and that it was altogether so fraught with practical difficulties, that from the time it is supposed to have been inaugurated—viz., fourteen years after the Israelites' first entry into Palestine (seven years' conquest, and seven years' division of the land), it never seems to have been kept before the exile. It has erroneously been supposed by some that the slaves were set free in the sabbatical year. The passage in question refers only to the seventh year of the individual slave's service. Like the jubilee, it was proclaimed on the tenth day of the seventh month, at the end of the harvest-time. Reasonable doubts have been expressed regarding the "possibility" of the jubilee (q.v.) ever having been kept in reality; yet there is no doubt about the rigor with which the sabbatical year was kept up, after the exile, to a very late period. Alexander, Cæsar, and the late emperors exempted the Jews from tribute during it. The sabbatical year being one of the "ordinances attached to the land"—i. e., Palestine only—it ceased with the final overthrow of the Jewish commonwealth.

SABBIONET'TA or SABBIONETA, a city of northern Italy, province of Cremona, with 2,000 inhabitants. It is situated in a marshy district, which affords abundant fodder and pasturage. It was the capital of a principality given by Napoleon I. to his sister Pauline in 1806, and was a place of some consequence; now it is a decayed city, the population of which is daily decreasing.

SABEL'LIUS, a celebrated African heresiarch of the 3d c., was b. probably at Ptolemais in the Pentapolis, where, at all events, his opinions were first promulgated. Nothing is known regarding his life—the few statements current on the subject being of a contradictory and untrustworthy character, and it is generally thought that he did not broach his heresy till shortly before his death—the date of which is also unknown. Sabellius is pronounced by Neander "the most original and profound thinker among the Monarchians"—i.e., the Unitarians; but unfortunately only a few fragmentary notices of his teaching have been preserved, and these by his theological adversaries. It would appear that he did not reject the scriptural phraseology used in speaking of the Godhead. "Father," "Son," and "Holy Ghost" were sacred and venerable names to him as well as to orthodox Christians; but he was strongly opposed to the ecclesiastical conception of this Trinity, as a trinity of distinct persons, or subsistences (*hypostases*), which he (like many other persons since) held to be absurd and unthinkable, and argued that what is to be understood is a Trinity of manifestation. The single absolute Divine essence—the *monas* or "pure Deity," unfolds itself in creation and the history of man as a Trinity. His words, as quoted by Athanasius, are: *He monás platuntheisa gegone trias.* The "energy" by which God called into being and sustains the universe is the "Logos," after whose image men were created; but when they had fallen from perfection, it became necessary for the "Logos," or divine energy, to hypostatize itself in a human body, in order to raise and redeem them; hence in the man Christ Jesus dwelt the fullness of the Godhead *bodily;* while the same divine energy, operating spiritually and impersonally in the hearts of believers, is the "Holy Ghost." This is not, perhaps, so very heretical after all. But, on the other hand, we must not overlook the fact that Sabellius held these Divine "manifestations" to be merely temporary, and that after the "Logos" and the "Holy Ghost" had done their work, they would be reabsorbed in the absolute Deity—the *trias* would again resolve itself into the *monas;* or, in the language of St. Paul, that "God would be all in all." Epiphanius alleges that Sabellius derived his system from an apocryphal "gospel to the Egyptians;" and there are (as Neander points out) so many points of resemblance in Sabellianism to both the Alexandrian Jewish theology in general, and the particular gospel referred to, that the statement may be regarded as at least indicating the direction from which proceeded the influences that determined the theosophy of the unknown Pentapolitan. The followers of Sabellius were formally suppressed by the Catholic church in the 4th c.; but his doctrine, which, divested of its Gnostic and Neoplatonic phraseology about "emanation" and "reabsorption," etc., is substantially Unitarian, has seldom wanted eminent advocates in any subsequent age of Christianity. —Consult Tillemont's *Memoirs;* Lardner's *Credibility of the Gospel;* and the Church Histories of Mosheim, Neander, and Milman.

SABER, a heavy sword, with which dragoons are armed. The back is thick, that a blow may carry the more force, and also to render the weapon useful in the rough thrust of a cavalry charge. A saber is occasionally curved at the point, in the form of a cimeter.

SABER-TA'CHE (Ger. *säbeltasche,* sword-pocket), a useless square accouterment which dangles against the legs of officers in some cavalry regiments. It purports to be a pocket for the conveyance of dispatches, etc., but probably is never used. The saber-tache is hung by smaller ornamental belts from the sword-belt, and is itself covered with gold brocade, the emblems of the regiment, and other devices.

SABIANS. See SABÆANS, *ante.*

SABICU, *Acacia formosa* (see ACACIA), a tree, the wood of which is remarkably hard and tough. It is a native of Cuba. The wood is of a dull red color, and close short grain. The wood was used to construct the stairs of the crystal palace in Hyde park in 1851, and "after six months' use the steps hardly exhibited any signs of wear."

SABIN, JOSEPH, b. England, 1821; became a bookseller, afterward a publisher and bibliographer. In 1848 he came to the United States, where he is considered a high authority in all relating to his specialty. He has compiled catalogues of many private libraries, and was editor and part owner of the *American Bibliopolist.*

SABINE, a river of the United States, rises in the n.e. part of Texas, and flows s.e. 250 m. to the eastern boundary of Texas, whence flowing southerly, it forms the eastern boundary, and empties itself through Sabine bay, 18 m. long by 9 m. wide, into the gulf of Mexico. The Sabine is 500 m. long, but shallow and unnavigable.

SABINE, a parish in w. Louisiana; drained by the Sabine river and San Miguel bayou; about 972 sq.m.; pop. '80, 7,344—1858 colored. The surface is level and well wooded. The soil is good. The principal productions are corn and cotton. Co. seat, Manny.

SABINE, a co. in e. Texas, adjoining Louisiana, bounded on the e. by the Sabine river; watered by Patroon creek; about 575 sq.m.; pop. '80, 4,161—4,152 of American birth. The surface is level and heavily timbered. The soil is fertile. The principal productions are corn and cotton. Co. seat, Hemphill.

SABINE, Maj.Gen. Sir EDWARD, a celebrated British physicist, of Irish extraction, was born in 1790. After serving in the royal artillery for some time, he was promoted to the grade of lieut., and accompanied capt. Ross (q.v.) and lieut. Parry (q.v.) in their expedition (1819–20) to the n. coast of America (see NORTH-WEST PASSAGE), making during the voyage a series of magnetic observations of great value. These observations formed the substance of two papers which he communicated to the royal society on his return. A strong desire of continuing the investigation of this and other branches of experimental physics, prompted him to undertake a series of voyages to places between the equator and the north pole, making at each point observations on the length of the seconds pendulum, and on the dip and intensity of the magnetic needle. The fruits of these labors were of high importance, and were published, along with other information, in 1825. From this period his history is that of a studious investigator into the laws and phenomena of nature, broken only by a short term of military service in Ireland, during which he rose to the rank of maj. In 1836 he communicated to the British association at Bristol his observations on the declination and intensity of the magnetic force in Scotland; and to the same association he delivered, at Liverpool, in 1837, a report on the variations of magnetic intensity at different parts of the earth's surface. The rest of his researches into the nature and action of magnetic force will be found in detail in the *Transactions* of the above-mentioned association of the royal society, and in the *Philosophical Transactions.* His labors have led to the discovery of the laws of "magnetic storms," of the connection between certain magnetic phenomena and the changes of the solar spots, and of the magnetic action (independently of heat) of the sun and moon on the earth. He deserves almost the sole credit of extending the body of known facts in magnetic science by the establishment of magnetic observatories in all parts of the world, and by the collation of the enormous mass of facts thus acquired. In 1818 Sabine was elected a fellow of the royal society; in 1850 he became its vice-president and treasurer, and in 1861 its president. He was for 21 years one of the general secretaries, and for 8 years sole general secretary of the British association, and filled the office of president in 1852. In 1856 he was raised to the rank of maj.gen.; in 1869 he was created a knight-commander of the bath; and in 1875 a corresponding member of the French academy.

SABINE, LORENZO, 1803–77; b. N. H.; merchant, bank officer, and deputy-collector of Passamaquoddy, Maine. In 1851 he was elected to congress from Massachusetts. He is best known as the author of the *American Loyalists*, address on the anniversary of gen. Wolfe's death, and other historical and biographical papers.

SABINE PASS, a seaport t. of Texas, the terminus of the St. Louis and Mexican Gulf railroad, and having communication with the interior of the state and Louisiana by the Neches and Sabine rivers; the water in its inner harbor is from 25 to 40 ft. deep. When the railroad to St. Louis is opened the town will become large and important.

SABI'NI, an ancient people of central Italy, whose territory lay to the n.e. of Rome. The boundaries of the territory cannot be determined with exactness, but it appears to have extended from the sources of the Nar, on the borders of Picenum, as far s. as the Anio. The nations conterminous to the Sabini were the Umbrians on the n., the Umbrians and Etruscans on the w., the Latins and Æqui on the s., and the Marsi and Picentini on the east. The entire length of the Sabine territory did not exceed 85 m., reckoning from the lofty and rugged group of the Apennines, anciently known as the *Mons Fiscellus* (now *Monti della Sibilla*), to Fidenæ on the Tiber, which is not more than 5 m. from Rome. The principal towns were Reate, Interocrea, Falacrinum, Nursia, Amiternum, Casperia, and Cures, but none of these places were of any size or political importance. The inhabitants had no inducements to congregate in large towns. Their country was an interior region; much of it, especially in the n., very mountainous and bleak, though the valleys were (and are) often richly productive; and thus cut off from the sea-board, and even from that easy access to their neighbors which lowland districts admit of, they (like all the other races who peopled the sequestered regions of the Apennines) scarcely advanced beyond the rude simplicity of their primitive highland hamlets. The Sabines were a brave, stern, religious race, whose virtues were all of an austere and homely character. Cicero speaks of them as *severissimi homines*, and Livy notes the *disciplina tetrica ac tristis veterum Sabinorum* ("the stern and grave discipline of the old Sabines"), while the poets of the empire—Horace, Virgil, Juvenal, etc., are fond of contrasting their simple, uncontaminated modes of life with the vicious luxury and dissipation of the capital. What part, if any, they had in the foundation of the city of Rome cannot now be ascertained, as the whole story of the Ramnes, Tities, and Luceres has come down to us in a purely mythical form (see ROME) Their native tutelary deity was "Sancus," or Semo-Sancus" = Lat. *Sanctus*, the "holy" or "venerable;" but like the other Latino-Sabellian races, they also worshiped Jove, Mars, Minerva, Sol, etc. That the Sabini were an ancient people in Italy is certain. They were probably most nearly allied to the Umbrians, whose tutelary god was also "Semo-Sancus;" and, in fact, they are generally considered an offshoot of that people; but they themselves, on the other hand. became so numerous that they were obliged to send forth numerous colonies, who founded new nations to the s. and e., the Picentes, Peligni, Samnites (q.v.) etc.; while the Samnites (a name essentially the same as *Sabini;* the Greek form *Saunitai* = *Savnitæ* = Oscan name *Safini* or *Sabini*) in their turn became the progenitors of the Lucanians, Campanians, and Bruttii. Hence the epithet *Umbro-Sabellian*, in use among classical ethnologists, to denote the whole of these kindred races, who were also allied, but less closely, to the Latins (see LATINI) and Oscans (see OSCI). Of the Sabine language only a few words remain, which, however, seem to indicate that it differed from the Latin only dialectically: thus, Lat. *hircus*, Sab. *fircus;* Lat. *hostis*, Sab. *fostis*, etc.; analogous to the Aberdeen *filk* for "whilk," *fat* for "what," etc. For further information see ROME, HISTORY OF.

SABLE, *Martes zibellina*, a species of marten (q.v.), so nearly allied to the common marten and pine marten that it is difficult to state satisfactory specific distinctions. The feet are covered with fur, even on the soles, and the tail is perhaps more bushy than in the British martens. The length, exclusive of the tail, is about 18 inches. The fur is brown, grayish-yellow on the throat, and small grayish-yellow spots are scattered on the sides of the neck. The whole fur is extremely lustrous, and hence of the very highest value, an ordinary sable skin being worth £6 or £7, and one of the finest quality £15. The fur attains its highest perfection in the beginning of winter, and the pursuit of the sable at that season is one of the most difficult and adventurous of enterprises. The sable is a native of Siberia, widely distributed over that country, and found in its coldest regions, at least wherever forests extend. The progress of geographical discovery in the eastern parts of Siberia has been much indebted to the expeditions of the hardy and daring sable hunters, exploring new regions at the worst seasons of the year, and spending dreary months at a great distance from all human abodes. The sable is taken by traps, which are a kind of pitfall, it being necessary to avoid injury to the fur, or by tracking it through the snow to its hole, and placing a net over the mouth of the hole. It is a very wary animal, and not easily captured. It makes its nest in a hollow tree, or sometimes, it is said, by burrowing in the ground, and lines it with moss, leaves, and grass. From this it issues to prey on hares and smaller animals of almost any kind, its agility enabling it even to catch birds among the branches of trees. It is ready, when food is scarce, to eat the remains of an animal on which a larger beast of prey has feasted, and is said even to satisfy its hunger with berries in winter, when animal food is not to be had.

SABLE, one of the tinctures in heraldry, implying black. In heraldic engravings it is represented by perpendicular and horizontal lines crossing each other.

SABLE ISLAND. See Nova Scotia.

SABLES D'OLONNE, Les, a sea-port of France, in the department of Vendée. It owes its early importance to Louis XI., who excavated the port, and raised the fortifications. In 1688 its merchant marine was more important than that of either Nantes or Rochelle. The commerce is in grain, wines, cattle, fish (sardines), salt, etc. Pop. '76, 9,188, who are almost all engaged in a sea-faring line of life.

SABOTS, a species of wooden shoes much used by the French and Belgian peasantry, especially by those who inhabit moist and marshy districts, as an effectual protective of the feet from external moisture. The fabrication of sabots forms an important branch of French industry, and is chiefly carried on in the departments of Aisne, Aube, Maine-et-Loire, and Vosges. After being made they are subjected to the smoke of burning wood till they acquire that reddish color so much prized in certain countries.

SABRI'NA LAND, discovered in the Antarctic ocean, Mar. 20, 1839, by Balleny, in lat. 69° 58′ s., long. 121° 8′ east. See Antarctic Ocean.

SAC, a co. in n.w. central Iowa, watered by the Raccoon and Boyer creeks; about 575 sq.m.; pop. '80, 8,774—7,138 of American birth. The surface is rolling. The soil is fertile. The principal productions are corn, wheat, oats, and rye. Co. seat, Sac City.

SAC'CHARIC ACID ($2HO,C_{12}H_8O_{14}$) is a product of the action of nitric acid, under certain conditions, on grape and cane sugar, or on starch, gum, and lignine. It occurs as a colorless, inodorous, deliquescent, gummy, uncrystallizable mass, which is freely soluble in alcohol. It is sufficiently powerful to dissolve iron and zinc, with extrication of hydrogen. It has a tendency to form double salts, so that it is probably a bibasic acid.

SACCHAROM'ETER, an instrument for determining the quantity of sugar in liquids, especially brewers' and distillers' worts. In principle it resembles the hydrometer, used for ascertaining the strength of alcoholic liquids. It consists of a hollow sphere or oval of thin brass, with a graduated stem and a hook so placed opposite each other that, when placed in water, it floats, and the graduated stem stands upright on the top, and the hook is below, for the purpose of appending weights. The degree to which the stem sinks gives the means of calculating, by tables prepared on purpose, the proportion of saccharine matter present in the liquid.

SAC'CHARUM. See Sugar-cane.

SACCHI'NI, Antonio Maria Gasparo, 1734–86; b. near Naples, Italy; educated in music at the San Onofrio conservatory, Naples, and by Durante. His first and most successful opera was *Semiramide*, produced in 1762. In all he composed about 50 operas, most of which were brought out in Italy, but some in Germany, London, and Paris. Among the best were *Alessandro nell' Indie*, *Tamberlano*, and *Œdipe à Colone*.

SACCŎMY'DÆ, a family of rodents comprising the pouched rats and gophers of North America, having large external cheek-pouches. Some of them have the fore-feet greatly developed and adapted for burrowing. Others, called kangaroo rats, have very long hind legs, while the fore legs are not specially developed. There is some confusion in the classification, as the kangaroo rats (*dipodomys*) more resemble the jerboas of Africa (family *dipodidæ*). The term gopher having been applied to various burrowing animals with generic and family differences, has led to the confusion.

SACCOTOO. See Sokoto.

SACHEVEREL, Henry, d.d., was b. in the year 1672, at Marlborough, where his father was minister of St. Peter's church, and noted for his attachment to the high church principles, which were afterward embraced by his son. The youth was educated at the grammar-school of his native place, and at Magdalen college, Oxford, where he occupied chambers along with the celebrated Addison, who then and for many years afterward seems to have entertained for him a warm regard. He obtained a fellowship in his college, and took successively the degrees of m.a. (1696), of b.d. (1707), and of d.d. (1708). In 1705, he became preacher of St. Saviour's, Southwark; and in 1709, he delivered the two sermons—one at the assizes at Derby, the other on Nov. 5, at St. Paul's—which have given him a place in the history of his country. The rancor with which he attacked in these sermons the principles of the revolution settlement, asserted the doctrine of non-resistance, and decried the act of toleration, excited the indignation of the whig government of the hour, and led to his impeachment for high crimes and misdemeanors. His trial before the house of lords took place in the spring of 1710, and resulted in his being found guilty, and suspended from preaching for three years, the obnoxious discourses being ordered to be publicly burned by the hangman. Of the rage of factions on the occasion, the fury of the popular excitement, and the excesses of the high church party, an account in detail will be found in any history of the period. Sacheverel became for the time the most popular man in the kingdom, and the general election which followed was fatal to the government which had prosecuted him. When, in 1713, his suspension as by sentence expired, as a special mark of honor he was appointed by the new house of commons to preach before them the sermon on the anniversary of the restoration, and specially thanked on the occasion. A more substantial token of favor was his presentation to the rectory of St. Andrew's, Holborn.

Subsequently—except that there is some reason to believe he was more or less concerned in a plot to restore the Stuarts—he disappears from the sphere of history. He is said, in his later years, to have sought the excitement which may in some sort have become necessary to him, in a series of paltry and undignified squabbles with his parishioners. Nor in this is there anything improbable. His character was essentially a weak, vain, and shallow one, and he remains notable merely as one of those men, intrinsically insignificant, who have had a spurious notoriety and importance thrust upon them by the accident of foolish activity in a special concurrence of circumstances. See Burton's *Reign of Queen Anne* (1880).

SACHS, HANS, the most prolific and at the same time the most important German poet of his time, was b. on Nov. 5, 1494, at Nürnberg, where his father was a tailor. While at school he learned the rudiments of Latin, but at no time of his life could he be called a scholar in the strict sense of the term, although he was certainly a well and widely-informed man. About the age of 15, he was sent to learn the craft of shoemaking; his love of verse, however, also led him to become a disciple of Leonhard Nunnenbeck, weaver and *meistersinger* in his native town. On finishing his apprenticeship, Sachs, as was the custom of craftsmen in those days, made a sort of tour or pilgrimage through Germany, frequenting assiduously the verse-making schools or corporations organized by the trade-guilds in the different cities, the members of which, known as *meistersingers*, had, since the disappearance of the older *minnesingers*, or minstrels of chivalry, become the chief representatives of German poetry. On his return to Nürnberg, he commenced business as a shoemaker, prospered in his calling; and after a long, cheerful, and happy life, died on Jan. 25, 1576, at the age of 82. Sachs was twice married—first to Kunegunda Kreutzer, who bore him five sons and two daughters: and afterward, in his 66th year, to Barbara Harscher. His grave is still to be seen in St. John's churchyard, Nürnberg. Sachs's career as an author is divided into two periods. In the first, he shows an interest mainly in the occurrences that were then agitating Germany. It was the epoch of the reformation of Luther, whose praises he celebrated (1523) in an allegorical tale entitled *Die Wittenbergisch Nachtigal*, while his poetical fly-sheets (of which about 200 are known) furthered in no small measure the Protestant cause. In the second period, his poetical activity was turned more to the delineation of common life and manners. His poetry is distinguished by its heartiness, good sense, homely genuine morality, and freshness; its clear and healthy humor, and its skillful manipulation of material. It is, on the other hand, deficient in high imagination and brilliant fancy, and contains large tracts of dry, prosaic, insipid verse. Sachs's best productions are his *Schwänke*, or merry tales, the humor of which is sometimes unsurpassable; but his serious tales, allegorical and spiritual songs, and his dramas, also show a great advance on his predecessors. His special *meistergesänge*, on the other hand, are of little or no value. Manuscript copies of Sachs's poems—some in his own handwriting—are to be seen in the libraries at Zwickau, Dresden, Leipsic, and elsewhere. When Sachs had reached the 52d year of his career as a poet, he took stock of his work, and found that he had written 34 vols., containing upward of 6,200 pieces, among which were 4,275 meistergesänge. 208 comedies and tragedies, about 1700 merry tales, secular and religious dialogues, proverbs, and fables, 7 prose dialogues, and 73 songs, secular and devotional. The first edition of his works was published at Augsburg in 1558, but the best is that of Willer (5 folio vols. 1570–79); a later quarto edition, known as the *Kemptener*, appeared in 1612—1617, and was republished at Augsburg in 1712. After the middle of the 17th c., when a deep stupor seized the German mind, and it could produce nothing but endless tomes of theology, varied by an occasional hymn of more or less merit, Sachs's, with all his poetic brethren, suffered a total neglect, from which he did not recover till Goethe wrote his pleasant poem, *Hans Sachs, Erklärung eines alten Holzschnitts vorstellend Hans Sachs's poetische Sendung* (1776), since which time partial collections of Sachs's works have frequently appeared.

SACK, a large bag made of a coarse hempen cloth called sacking or sackcloth. Such bags are used for the conveyance of corn, flour, and other bulky articles. A corn-sack is usually made to contain four bushels, hence it is constantly spoken of as a measure of quantity, two sacks being equal to one quarter of corn.

SACK. A name in common use in the time of Shakespeare, and occurring down to the middle of the 18th c. as denoting a kind of wine. The exact nature of this famous wine, the favorite beverage of Falstaff, and the origin of the name, have been much discussed. Sack or seck seems to be simply an English disguise of the Spanish *seco* (Fr. *sec*), applied to wines of the sherry genus, as distinguished from the sweet wines; a term which we now translate by "dry."

SACK'BUT (Fr. *saquebute*), the name under which the trombone (q.v.) was known on its first introduction to England.

SACKETT, DELOS B., b. N. Y.; graduate of West Point 1845; served in the Mexican war with the 2d dragoons at Palo Alto and Resaca de la Palma; brevetted capt.; rose through successive grades to col. and inspector-gen., 1861. In the war of the rebellion he served on the staffs of McClellan and Burnside through the principal battles in Maryland, and on the peninsula including Fredericksburg, and was brevetted maj.-gen. U.S. army, 1865.

SACKETTS HARBOR, a village and port in New York, U.S., on the s. shore of Black river bay, 8 m. e. of lake Ontario, 170 m. w.n.w. of Albany, having a navy-yard, barracks, mills, etc. In the war of 1812, it was an important port, where the frigate *Superior*, of 66 guns, was built in 80 days, and the *Madison* in 45 days, from timber standing in the forest. A man of-war of 3,200 tons, begun before the treaty of disarmament, is still upon the stocks. The town has declined since the war, and has now a population of but (1875) 734.

SACKVILLE, GEORGE GERMAIN, Viscount, 1716–85; b. England; son of the first duke of Dorset. He entered the army, was at Dettingen and Fontenoy, was appointed lieut.gen.; led the allied cavalry at Minden 1759, and for his failure to carry out the order of the commander-in-chief to charge the French cavalry, was court-martialed. As lord George Germain, he was colonial secretary during the revolutionary war.

SACKVILLE, THOMAS, Earl of Dorset, an English poet and statesman, was b. at Buckhurst, Sussex, in 1536. He was the only son of sir Richard Sackville; studied at Oxford and Cambridge, where he acquired a high reputation as a poet both in Latin and English, and afterward became a student of the inner temple. While a member of this society, he wrote, along with Thomas Norton, a blank-verse tragedy, called *Ferrex and Porrex* (afterward called *Gorboduc*), which was performed before queen Elizabeth at Whitehall in 1561–62. This work, the plot of which is founded on a British legend, claims particular notice as the earliest tragedy in the English language. It is molded to some extent on the classic drama, the incidents being moralized at intervals by a chorus. It has no dramatic life or energy, but the style is pure and stately, evincing eloquence and power of thought. Sackville's other productions (first published in 1563) are the *Induction*, a poetical preface to the *Mirror for Magistrates*, and the *Complaint of the Duke of Buckingham*, which was designed to conclude the work. The *Induction* is a noble poem, uniting, as Hallam says, "the school of Chaucer and Lydgate to the *Fairy Queen*," and almost rivaling the latter in the magnificence and dignity of its allegoric personifications. The influence of Dante is very perceptible. Sackville now abandoned literature, and after traveling in France and Italy, returned to England, and entered public life. Soon after his father's death in 1566, he was created lord Buckhurst, became a favorite with the queen, who employed him in foreign diplomacy, and on the death of Burleigh, succeeded him in his office of lord high treasurer (equivalent to prime-minister in those days), in which capacity he showed himself not inferior in sagacity and fidelity to his great predecessor. On the accession of king James, his patent of office was renewed for life; and in the following year, he was created earl of Dorset. Sackville died April 19, 1608, and was buried with ceremony in Westminster abbey. His works are edited by the rev. Sackville West, in Smith's *Library of Old Authors* (Lond. 1859).

SA'CO, a river of New England, U.S., rises in the White mountains of New Hampshire, runs south-easterly through the south-western portion of Maine, through Saco bay, to the Atlantic ocean. Its course of 160 m. is almost a continuous succession of falls, the last being but 4 m. from its mouth, affording water-power to numerous factories.

SA'CO, a t. in Maine, U.S., is built on the e. bank of the Saco river, at its last falls, 4 m. from its mouth, 14 m. s.w. of Portland. It has numerous manufactories, including 5 cotton-mills, which produce 7,000,000 yards annually, 4 saw-mills, and several ship-yards. Pop. '70, 5,755.

SACO (*ante*), a city in York co., s.w. Maine, taken from Biddeford with the name of Pepperellboro, in 1762; on the Portland, Saco and Portsmouth, the Boston and Maine, and the Eastern railroads; pop. '80, 6,396. It is connected with Biddeford on the w. side of the river by 4 bridges. The river is open to vessels of 9 ft. draught for 9 months in the year. It has several hotels, and surroundings of great natural beauty, the fashionable watering-place of Old Orchard Beach being within 3½ m. easy drive. It has a brisk coasting trade, and its industries comprise the manufacture of cotton machinery, boots and shoes, belting, brushes, loom harness, etc. The York Manufacturing company's cotton-mills employ 1000 operatives. It has a weekly newspaper, a beautifully shaded common, a city hall, a fire department, 2 national banks with an aggregate capital of $200,000, 2 savings-banks with $1,500,000 deposits, a fire-insurance company, and an athenæum with a library of 2,000 vols.

SACRAMENT (Lat. *sacramentum, mysterium*, Gr. *mysterion*), the name given by theological writers to certain religious rites, the number as well as effects of which are the subject of much controversy between various bodies of Christians. The word *sacramentum*, in primitive classical usage, meant either the oath taken by soldiers on their first enrollment, or the sum of money deposited by suitors on entering upon a cause, and forfeited "to sacred uses" by the unsuccessful party; and the corresponding classical Greek word *mysterion* meant not merely the secret religious ceremonies practiced in the worship of certain gods, but also any revealed secret. It is certain, nevertheless, that at a very early period of the Christian church both the Latin word and its Greek equivalent came to be applied specially to certain rites of the Christian ceremonial, and chiefly (or as is commonly held by Protestants, exclusively) to those of baptism and the eucharist. Of the catechetical lectures of St. Cyril of Jerusalem, the lectures devoted to the subject of baptism and the eucharist are called "mystagogic lectures." For our purposes, it will be enough to state concisely what are the views of the several religious communities on this much controverted subject, which formed one of the earliest grounds of division between the Roman church and the reformers of the 16th century.

In the Roman church it is held that there are seven sacraments, viz.: baptism, confirmation, the eucharist, penance, extreme unction, holy orders, and matrimony. The special teaching of Catholics on each of these rites will be found under the several heads; but there are certain general principles regarding them all, on which the Roman Catholic doctrine differs widely from that of the Reformed communities. Catholics define a sacrament to be a visible or sensible sign permanently instituted by God, and conveying real interior grace to the recipient, and they teach that all sacraments contain within themselves, as instruments, and, when they are received with proper dispositions, produce such grace by the virtue imparted to them by God, and not merely through the faith of the recipient; although they hold that proper dispositions on the part of the recipient, as sorrow for sin, love of God, pious resolves, etc., are conditions indispensable for the efficacy of the sacramental rite. See OPUS OPERATUM. They divide the sacraments into two classes, "sacraments of the living," and "sacraments of the dead." The first class comprises the eucharist, confirmation, holy orders, and matrimony—all which sacraments can only be received fruitfully by persons in a state of grace or justification. The second includes baptism, penance, and extreme unction, the special purpose of which is to remit sin, and which therefore can be received by persons in a state of sin, but penitent for that sin, and resolved to amend their lives. Of three of the sacraments, viz., baptism, confirmation, and holy orders, it is held that they imprint a "character," and therefore that they can only be received once. The others may be repeatedly received, but under conditions which will be learned under each separate head. Two things are held to enter into the constitution of the sacrament—viz., the "matter" and the "form." By the former is meant the material element or the physical action whereby that element is applied to the recipient of the sacrament; as water in baptism, oil in extreme unction, and in both the act of washing or of anointing. By the latter is understood the form of words employed by the minister in communicating to the recipient the external rite in which the sacramental act consists. The minister of a sacrament is the person who is supposed to be divinely authorized to impart it. The minister is different for different sacraments, as will be found under each separate head.

The reformed churches have for the most part discarded these views. By the majority of them the sacraments are held to be merely ceremonial observances, partly designed as a solemn act, by which each individual is admitted to membership, or desires to make solemn profession thereof; partly intended to stimulate the faith and excite the fervor and the pious dispositions of the recipient, to which dispositions alone all the interior effects are to be ascribed. As to the number of rites called by the name, almost all Protestants agree in restricting it to two—viz., baptism and the Lord's supper; although some of the rites which Catholics regard as sacramental are retained by some of the Protestant communities as religious observances. In the English church, however, there has always been a school in which opinion tending toward the Catholic view has prevailed. Not only has this school ascribed to the two rites of baptism and the eucharist or Lord's supper (q.v.) the power of producing an interior grace (which in the former is called regeneration); but many of them have been willing to call the other rites, especially confirmation, penance, and holy orders, by the name of sacrament, although of a secondary character, and not "generally necessary to salvation." See TRACTARIANISM. The controversy on these questions has been in recent times the subject of more than one proceeding in the ecclesiastical courts and in the privy council.

SACRAMENTARIAN, the name given in the 16th c. to the party among the reformers who separated from Luther on the doctrine of the eucharist. Luther (q.v.) taught the doctrine of the real presence of the body and blood of Christ along with the bread and wine (see LORD'S SUPPER; REAL PRESENCE). The first of his followers who called this doctrine in question was Andrew Carlstadt; and notwithstanding the protest of his leader, Carlstadt had many followers, the most active of whom were Capito and Bucer. The party became so considerable, that in the diet of Augsburg they claimed to present a special confession distinct from that put forward by the general body. The sacramentarian confession is known in history by the name of the tetrapolitan confession—so called from the four cities, Strasburg, Constance, Lindau, and Memmingen The tetrapolitan confession rejects the doctrine of a corporeal presence, and although it admits a spiritual presence of Christ which the devout soul can feel and enjoy, it excludes all idea of a physical presence of Christ's body. Simultaneously with this German movement, yet independent of it, was that of the Swiss reformer Zwingli, whose doctrine on the eucharist was identical with that of Carlstadt, and who himself presented a private confession of faith to the Augsburg diet, in which this doctrine is embodied. The four cities named above continued for many years to adhere to this confession presented to the diet of Augsburg in their name; but eventually they accepted the so-called confession of Augsburg, and were merged in the general body of Lutherans. On the contrary, the article of Zwingli upon the eucharist was in substance embodied in the confession of the Helvetic church.

SACRAMENTO, a large river in California, which, with the San Joaquin, drains the great central valley. It rises in the north-eastern part of the state, in the Sierra Nevada, by north and south forks, where, during its south-westerly course of 200 m., it is called Pitt river and Upper Sacramento; thence it flows nearly due s., receiving numerous branches from the Sierra Nevada on the e., and the coast-range of mountains on the w., until it unites with the river San Joaquin, and flows westerly through San Pablo and San Francisco bays to the Pacific ocean. It is navigable to Sacramento, 50 m. from San Pablo bay, and for small vessels 150 m. further, its entire length being about 500 miles.

SACRAMENTO, a co. in n. central California, bounded on the w. by the Sacramento river, drained by the Cosumne, the American, and the San Joaquin rivers, traversed by the Central Pacific railroad; about 1100 sq.m.; pop. '80, 34,391—21,897 of American birth. The surface is mostly level, without timber. The soil is fertile. The principal productions are barley, wool, hay, fruit, and hops. Gold is found. Co. seat, Sacramento.

SACRAMEN'TO, a city and port of entry and capital of California, is built on the e. bank of the Sacramento river, 125 m. from the sea, lat. 38° 33′ n., long. 121° 20′ west. The streets cross each other at right angles on a level plain, only 30 ft. above the sea. The stores and shops are built of brick, the dwellings of wood, with shade-trees and gardens. The principal public buildings are the state capitol, custom-house, and post-office. The chief trade is furnishing supplies to the mining districts, with which it has daily communication by steamers and stages. Sacramento was settled in 1839 by capt. Sutter, a Swiss, who built a fort. In 1848 the first town-lots were sold, and the first house built in 1849. In 1853 the town was inundated to the depth of five feet in the streets, which have been raised and protected by embankments. In 1854 it became the state capital, and in 1870 had a population of 16,283.

SACRAMENTO (*ante*), capital of California and of Sacramento co.; at the junction of the American and Sacramento rivers, about 75 m. n.e. of San Francisco in an air line, and by water 120 m.; it is the terminus of the California Pacific, and is a station on the Central Pacific railroads; pop. '80, 21,240; exceeded by only two cities of the state, San Francisco and Oakland. It may be reached by boat from San Francisco. The situation of the town is very low, and in former years it suffered greatly from inundations, but the business section is now raised several feet above the original level, and the rest of the city protected by a levee constructed in 1862 at a cost of $250,000. The climate is semi-tropical, and there are many gardens noted for the beauty and variety of flowers, trees, and shrubs, of which some are always in bloom and many are of species unknown in the east. The streets are regularly laid out and designated by numbers and letters. The principal public buildings are the state capital, one of the finest edifices of the kind in the country, erected in 1861 at an expense of $2,500,000, and standing in the midst of a beautiful park of about 50 acres; the governor's residence, masonic and other society halls, the Sacramento library, the hall of the state agricultural society, a convent, hospitals, and a theater. The city has been visited by two destructive fires, one in 1852, which destroyed over 600 buildings, and the damage from which was estimated at $5,000-000; the other, two years later, with an estimated damage of $650,000. Sacramento is favorably situated for intercourse with the interior of the state, and has a very large trade with the mining and agricultural districts, supplying them with provisions and necessaries, and receiving and shipping their products. Here are several refining and smelting works, flouring mills, breweries, and manufactures of furniture, liquors, machinery, agricultural implements, carriages, etc. The machine, car, and repair shops of the Central Pacific railroad are very extensive, employing nearly 1500 men. There are 19 schools, 14 churches, a high school, normal school, and college for women, several banks, and 3 daily papers. The Chinese pop. is estimated at about 2,000.

SACRA'RIUM, a sacred apartment in Roman houses.

SACRED HEART OF JESUS, FEAST OF, a modern festival of the Roman Catholic church. Its origin is traced to a vision which is recorded of a French nun, of the order of the Visitation, named Mary Margaret Alacoque, who lived at Paray la Moniale, in Burgundy, in the latter half of the 17th century. This devotion was gradually propagated in France, and at length was approved by Pope Clement XII. in 1732 and 1736, and by Clement XIII. in 1765. The festival is held on the Friday after the octave of Corpus Christi. During recent years a fresh impulse has been given to the devotion, and in 1873 numerous bodies of pilgrims resorted to Paray la Moniale; and several dioceses and countries were dedicated to the sacred heart by special and solemn ceremonial. The confraternities of the sacred heart are very numerous.

SACRED HEART, LADIES OF THE, a religious order of the Roman Catholic church, founded in Paris in 1800 by Joseph Désiré Varin, Madeleine Berat, and Octavie Bailly. The object of the order was the education of young ladies of the higher classes. The constitution was approved by Leo XII. in 1826; a house was opened in Rome and branches established in many cities. The first house in the United States was established by bishop Dubourg in 1817, near St. Louis. They have now about 20 houses in this country.

SACRED MUSIC. Music has, from very early times, been connected with religious rites. It entered into the worship of the Jews, and both sacred and profane history tell us that, in the primitive Christian church, the service consisted partly of music. Little is known regarding the kind of music used by the early Christian converts; it has been supposed to have been partly Greek, with an intermixture of Hebrew melody. As early as the time of Ignatius, who was a disciple of St. John, the Psalms of David were sung *antiphonally*, as practiced to the present day—i.e., by two choirs responding to each other, which had doubtless been formerly the practice among the Jews. At first the whole congregation, clergy and laity, joined in the psalm; but difficulties and abuses having arisen from the growing neglect of musical culture, the council of Laodicea, in 363, found it necessary, for the securing of decency and order in worship, to prohibit the laity from singing in church except in certain chants of a very simple and popular character. From that period down to the reformation, the music of the church was almost entirely surrendered to the clergy and trained musicians. See PSALMODY.

The first name of importance in the history of the music of the western church is St. Ambrose, (q.v.), whose musical service (see AMBROSIAN CHANT) was reformed by pope Gregory (see GREGORIAN CHANT). The use of the organ in churches dates from about the 9th c., and some centuries later counterpoint (q.v.) was introduced to a limited extent into the music of the church. Among the corruptions which followed it, some are of a nature the very mention of which startles us. Not merely were popular melodies of a secular nature often taken and worked up into church music, but the secular words were actually transplanted into the religious compositions, being habitually given out by the tenor voice, while the actual solemn words of the church service were being sung by soprano, alto, and bass. Papal bulls having sought in vain to combat this abuse, it was brought under the cognizance first of the council of Basel, and then that of Trent. The council of Trent prohibited the performance of any mass or motett of which profane words formed a part, and also of music founded on secular themes. Some compositions of Palestrina were singled out for praise, and their author was intrusted with the task of remodeling this part of religious worship. He composed three masses on the reformed principle, one of which, known as the *Missa Papæ Marcelli* (so called as being a tribute of gratitude to the memory of that pontiff), may be looked on as having saved music to the church, by establishing a type far higher than anything that had preceded it, and still revered by all lovers of music. The *mass* (including the *offertory* and *gradual*) has always continued to be an important part of the sacred vocal music of the Roman Catholic church, and affords large scope for the display of the higher qualities of musical composition.

Various new types of music sprang up in the different Protestant churches after the reformation. The solemn and measured *chorale* (q.v.), or melody to which psalms or hymns are sung in unison, though generally associated with the Lutheran church of Germany, was in reality handed down from a very early period. Psalmody in its modern sense may be considered to have originated in the 16th c., when Clement Marot, the court poet of Francis I., translated fifty-two of the Psalms into French verse. Psalm-singing was at first a fashionable amusement of the gay courtiers of Francis; but, being taken up by the reformers, was soon discountenanced by the Roman Catholics, and looked on as a badge of Protestantism. See PSALMODY.

In the full choral service of the church of England, as performed in cathedrals and collegiate churches, the greater part of the prayers and the litany are *intoned* or read in monotone (see INTONING), the monotone being occasionally varied by harmony at the close. The Psalms and *Gloria Patri* are chanted with the accompaniment of the organ, as also are the various canticles; the latter, however, particularly the *Te Deum*, being often sung to rhythmical music of a more elaborate kind, called *services*. The form of the Anglican chant now used for the Psalms seems to have been invented by Tallis. In the single chant each verse is sung to the same music; in the double chant, the whole occupies two verses. The antiphonal chanting, with the Anglican double chant, has sometimes been objected to as repugnant to the proper expression of the words, as coupling verses between which there is a full stop in the sense, and as placing a full stop when the sense runs on; and among the high church party there has been a disposition to recur to the Gregorian chants, whose indefinite musical expression, absence of rhythm, and uncertain accent, give them a power of bending to the requirements of the words. The Gregorian chant has, however, not succeeded in making its way into the service of any of the English cathedrals. The *anthem* forms a part of the complete musical service. It is somewhat similar in character to the motett of the Roman Catholic and Lutheran churches; a sacred cantata, in which the words are taken from the Psalms or other portions of Scripture; and the music is for solo, parts, or chorus, or a mixture of the three.

In the Presbyterian churches of Scotland, psalmody, until recently, formed almost the entire music; but hymns also are now in general use. Hymns predominate among the English dissenters. Some years ago, church music in Scotland had fallen to the lowest state of degradation; but efforts have lately been made, with some success, to raise its character. Even organs, which were proscribed by the early Scottish reformers, and have ever since been in disfavor, have begun to be introduced, and chanting has been admitted into some Presbyterian churches.

Of sacred musical compositions not intended to form part of the service of the church, the most important is the *oratorio* (q.v.), a composition either entirely dramatic, or combining the drama and epic, where the text is illustrative of some religious subject, and the music consists of recitatives, airs, part-songs, and choruses, accompanied by orchestra and organ.

SACRIFICE, one of the most important elements of divine worship, common to all nations of antiquity, and therefore traced by some to a primeval revelation. The powers of nature, palpable in their effects for good and evil, could not but inspire man, even in his rudest stage, with gratitude or fear toward the unseen being or beings by whom he conceived them to be actuated. The next and most natural step was the outward manifestation of these feelings by a token which bespoke either thankfulness or the wish of conciliation on the part of the donor. The supreme numina being conceived merely as superior men with exaggerated human wants, the means taken to gratify them were adapted to this conception. The best and first fruits of the soil, the finest and most immaculate animals of the flock, were offered to the gods, that they might either partake of them bodily or at least enjoy the sweet smell arising from the altar on which they were burned in their honor; and the deity was supposed emphatically to express its readiness to accept the offering by sending down the fire that was to consume the animal prepared. The more the divine favor was sought for some special purpose, the costlier and more precious became the gift; and nothing short of the most startling proofs of self-abnegation seemed, at times, to satisfy the devotion of man in his uncultivated state. From the simple and child-like notion of establishing a certain kindly and permanent relation between the invisible powers and man, by the yielding up on the part of the latter a certain more or less precious portion of what the former had given him, there grew up such horrible monstrosities that, in honor of humanity, we should feel inclined to doubt them were they not so well attested, and did they not, to a certain extent, still prevail in our own days. Method and system took in hand that undeveloped child-like instinct which touchingly offered the deity a flower, a blooming bough, a golden fruit, and degraded it into mysticism and superstition, ending at last in the theory that the divine revenge was to be gratified, the divine vanity flattered, and the deity made as generally pleased as could be by holocausts of human beings, friends or foes—nay, the dearer the being to the offerer the more the self-abnegation must become patent, and the more the god must smile upon the donor. The Moloch worship—the mother placing her babe in the arms of the monstrous idol, and seeing it slowly burned before her own eyes—seems well nigh to exhaust all the horrors of human ingenuity.

Turning first of all to those most ancient and hallowed records of humanity contained in the Old Testament, we find the custom of sacrifice almost on its first pages, and spoken of as a rite already established. Sacrifice is the cause of the first murder on record. Abraham is prevented by a voice from heaven from carrying out the slaughter of Isaac, into which he had been "tempted" by Jehovah; all the patriarchs, in fact, sacrifice, either independently or in ratification of a covenant; and the exodus itself was brought to pass under the pretense of the people having to offer up their wonted sacrifice in the desert.

According to the highest ancient authorities, both Jewish and Christian—of whom we will only mention Maimonides and Ephraem Syrus—the Mosaic sacrifices were neither more nor less than a kind of divine concession to the sensual nature of an uncultivated people, full of Egyptian reminiscences on the one hand, and surrounded by Canaanitish modes of worship on the other. It was, as Ephraem Syrus says, only at a very late period that Moses, by the command of God, in whose eyes the rites of priests and sacrifices have but little value, prescribed these observances to his people, on account of their weakness and hardness of heart—lest they might despise a "naked" religion, and attach themselves to false gods, whose magnificent and dazzling cultus surrounded them on all sides. In corroboration of this view, the prophets are appealed to, who never cease to inveigh against sacrifice as such, when, according to their view, the people were educated enough to do without this symbol and to worship God in truth and in spirit. (Compare Jeremiah vii. 22; I. Samuel xv. 22; Psalms l. 8–10; li. 18, 19; Isaiah i. 11, etc.) But the institution being deemed necessary for the time, legislation had to circumscribe it rigorously, so as to make it as little hurtful as possible. Ceremonies contrary to morals and decency, such as were practiced in the temples of Canaan, the abominations of phallic rites, the sacrifices of virginity, and, finally, the offering up of human beings, were punished with instant death by the Mosaic law.

How the principal modes of sacrificial offerings, such as they had naturally developed nearly alike everywhere throughout antiquity, and as they had obtained in the pre-Mosaic times among the Hebrews, were adopted in the Mosaic legislation, and adapted to its exalted religious character, we can only indicate here in the briefest outlines. These pre-Mosaic sacrifices were chiefly of three kinds: first, the "propitiatory," i.e., an offering enjoyed by the deity in any form that would be grateful to him, conciliate him, procure his aid and blessing in times of need or for some special undertaking, and would further obtain his forgiveness, if something had been done unwittingly that might have offended him. This kind of sacrifice, whether bloody or unbloody (e.g., harvest sacrifice), appears to have been fully burned (*Olah*). The second kind partook more of the nature of sacrificial meals, in which both the divinity, the priest, the man who offered the sacrifice, together with his friends, took a part. It was a solemn and joyous oblation, expressing the thanks of the individual for some obtained favor, in which he wished others to join. Only the parts supposed to be the choicest were burned upon the altar; the priests received some other parts, and the rest formed the grateful sacrificial repast (*Sebach Shelamim*). The last was the expiatory sacrifice, intended as an equivalent for some deadly crime, which either was not punishable by the existing laws, or which had been committed under circumstances that would not have warranted capital punishment. From the notion that the blood of the murderer was necessary for "the cleansing of the blood that is shed" (cf. Numb. xxxv. 33) sprang that other, it would appear, that there was expiatory power in the blood itself; and that further, the blood of an animal was a fitting representative of, and equivalent for that of the human criminal, who had only to transfer, as it were, his sin to the animal by placing his hand upon its head, and perhaps using a formula to that effect. The flesh of this animal was not deemed fit for the altar, and was probably burned at some other place (*Chattath, Asham*). The Mosaic legislation, finding such general elements ready, proceeded eclectically. They were partly embodied with considerable alterations, and partly rejected unconditionally. The anthropopathic idea of the "agreeable smell," as well as the notion of the expiatory power of the blood, were retained—the latter, however, with this modification, that the poor were allowed to use flour instead of meat for their sin-offerings. But the principal alterations introduced were the abolition of all polytheistic rites from the sacrificial service, of all the immoral, obscene, and horrible ceremonies connected with the heathen practice, and finally, the totally different definition and limits given to the "sin-offering." While formerly everything could be expiated by a sacrifice, henceforth only unpremeditated sin could by this means be effaced; while there was no expiation for any premeditated crime; the law simply took its course in that case.* Further, many things till then permitted were prohibited, and thus fell under the denomination of "sin," and certain purifications—beneficial in themselves—were connected with the expiatory sacrifice, and their practice thus strongly enforced. This extension of the notion of "sin-offering" rendered a subdivision of it necessary; the more venial, or rather unconscious transgressions, were treated differently from the less pardonable ones in the ritual.

While Mosaism thus seemed, in its adoption of the rite of sacrifice, to make one of the most important concessions to heathenism, this very rite was, on the other hand, calculated to attract the early Hebrews to the worship of Jehovah, and at the same time to wean them from the horrible practices connected with it among the Canaanites. But more: during the primary stages of the people's existence it served, by inculcating observances which were at once hygienic and symbolic of purity and holiness, as a powerful means of education and culture. In order, however, that these beneficial consequences premeditated by the law-giver should not be frustrated, it was necessary above all things to keep the strictest possible supervision over it; and this was best established by the legal transfer of the whole sacrificial service to one single spot of the land, finally, the temple at Jerusalem. The "heights" and their "heathen abominations" were thus theoretically abolished, and the sacrifice that only at one central point could in reality be said to be offered up for the "whole community of Israel," went far, under these circumstances, to awaken and to strengthen a common spirit of nationality and patriotism, which was further aided by the periodical pilgrimages. For the details of the Jewish sacrifices we must refer to the Old Testament generally.

As to the different opinions held by Jewish and Christian authorities regarding sacrifice when offered up in expiation of a sin, either by the people or by individuals, suffice it here to mention that they are divided between the various notions of the offering being either a present to the offended deity, a civil punishment (*mulcta*), or, finally, a kind of substitute for the sinners themselves. The latter is the view held by many of the rabbinical writers as well as church fathers. The life (Nephesh) of the animal or its blood (Lev. xvii. 11) was distinctly said to make "the atonement for the soul." This notion of a representative victim is one that belonged to the whole ancient world, and often finds its expression in the Old Testament. The sacrifice of the covenant (Jer. xxxiv. 18, etc.), the scapegoat (Lev. xvi. 21), and the like, are so many embodiments of this idea, which by Christian divines is held to have found its acme and final fulfillment in the sacrifice of God himself, as the "Man Christ," who united in himself the priest, the offerer, and the sacrifice. In fact, the whole institution of sacrifices is throughout the New Testament and the fathers held to have been merely typical of this final act, by which the sin of man was expiated. See ATONEMENT, MASS.

The Jewish sacrifices, rejected already by the Essenes, ceased with the downfall of the temple in Jerusalem, although the Samaritans, who claim to retain exclusively the Mosaic covenant, still continue this rite on mount Gerizim on the Passover. The orthodox Jews, however, include in the prayers for the restoration of the visible sanctuary on Zion also that of the restoration of the sacrifices "in their order and proper rule," "of the priests to their service, and the Levites to their songs and hymns," and each day, Sabbath or feast, the sacrifice incumbent upon it is mentioned in the prayers; and on fast-days, especially on the day of atonement, the diminution of bodily substance supposed to arise from the abstinence, the "the fat and blood" may, it is supplicated, be considered by God as tantamount for that of the sacrificial animals which, through their sins, the people are not now deemed worthy of offering up. The modern (extreme) party of reformed Jews, however, repudiate, together with the literal interpretation of the Messianic prophecies, also that notion of the sacrifices ever being restored again.

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* One of the most characteristic exceptions, however, was that in favor of those who had denied the possession of some pledged article, or who had wilfully cheated or robbed their neighbors. If they were eager to make voluntary and ample restitution, "the door of repentance was opened to them," and they were allowed to make public expiation through sacrifice.

We can only very briefly touch upon the sacrificial customs among other nations of antiquity. The same feeling of dependence upon supreme, invisible, but ever-present powers, engendered, as we said at the beginning, everywhere nearly the same expressions of awe, gratitude, and the like. The gifts proffered differed, according to the degree of culture, the mode of life, and the products of the soil among the different peoples. No less was the significance attached to the gift different in proportion to the mental development of those who offered; at one time considered as a present, to be taken and sensually enjoyed, as it were, by the Deity, it at others assumed a higher and purely symbolical aspect, as an expression of gratitude, love, repentance. In the same proportion, the gifts themselves varied, not only respecting their nature, but also respecting their value. While Mongols and Tartars, Lapps and Negroes, most of the ancient nomad tribes in fact, generally sacrificed the milk and the uneatable parts of the animal only, its bones, horns, skin, etc., the Greeks and Romans offered not unfrequently thousands of the choicest, most immaculate animals, and the sacrificial vessels were with them, as with the Hebrews, wrought of the most precious metals. Votive offerings—arms, spoil, garments, tools, locks, poems, etc.—customary in the better days of Rome and Greece, and the sacrifice of chastity on the part of maidens and women—chiefly the custom of Babylon, Phenicia, Cyprus, etc.—likewise fall under the denomination of sacrifice in its wider sense. Among the Indians, Bactrians, Medes, and Persians, the sacrifices consisted of fruits, libations, animals, and the like, and were of many degrees and numbers. Among the first-named, the study of the Vedas was reckoned as the first round in the sacrificial ladder. With the Persians (see GUEBRES, PARSEES), the priests at the Daruns sacrifice, instituted in honor of Zerdusht the lawgiver, eat small unleavened cakes, and drink Hom-juice, which is to represent the blood of the prophet. They also have sacrifices for the souls of the deceased. The Buddhists offer flowers and first-fruits only; their animal sacrifices are represented by small animal figures kneaded of dough, offered up on certain occasions. Of the "classical" peoples and their sacrificial debauches, which followed the primeval frugality in their offerings no less than in their lives, we need not speak here, save as far as they, too, indulged in the rite of human sacrifice from their very earliest period to their decadence. Among the Greeks, the legendary tales of the daughters of Erechtheus, and of Iphigeneia in mythical times, the sanctuary of Zeus Laphystius at Halos and at Lycæa, in Arcadia, the offering up of three Persians by Themistocles before the battle of Salamis, are tokens sufficiently indicative of the generality of the practice. Among the Romans, human sacrifices, in use during the republic—either enthusiastic voluntary deeds of patriotism, or simply a kind of execution in punishment of a deadly sin—were prohibited in later times by the senate; but both Augustus and Sextus Pompeius committed wholesale murders by way of political sacrifice to the gods. That this abomination of slaughtering men in honor of God at stated periods, flourished to an awful extent among our northern ancestors—Scandinavians and Germans, as well as among Gauls and other Celts—need hardly be added. At Upsala, every ninth year, a great sacrifice of expiation was offered up, consisting of nine human beings and sixty-three animals. The Danes, in the same manner, held a sacred sacrifice every ninth year, of ninety-nine men, besides horses, dogs, cocks, and other domestic animals (see the EDDAS; Muller, *Sagenbibliothek;* Pertz, *Mon. Germ. Hist.; Script. passim*, etc.). The German tribes, even after their conversion to Christianity, continued to offer up their prisoners of war, as of yore, just as the Franks brought their sacrifices both to their ancient gods and to Christ. Any illness, danger, sickness—the slightest inducement, in fact—sufficed to move the Gauls toward a human holocaust, in the fashion of the worshipers of Baal and Moloch. At the death of a man, all his possessions, movable and immovable, including slaves, clients, wives, and all, were offered up to his manes. See SUTTEE. That the ancient Mexicans, the negroes, and other wild tribes, were highly proficient in this sort of wholesale slaughter, need hardly be added: the king of Dahomey's practices, and the fruitless remonstrances of our own government, are a too well-known illustration of the firm hold this kind of murder in honor of the Deity has of the human mind. In conclusion, may we not consider the cruelties and massacres committed upon the Jews in the middle ages, in the name of Christ, as a last offspring of that Moloch or Baal worship which seems to be an instinct in the superstitious mind, whether Pagan or Christian?

SACRILEGE is not now a legal but is a popular term used to denote the breaking into a place of worship, and stealing therefrom. In England, whoever breaks and enters any church, chapel, meeting-house, or other place of divine worship, and commits any felony therein, or whoever, being in such places, shall commit any felony therein, and break out of the same, is guilty of felony, and liable to penal servitude for life, or for not less than three years, or to imprisonment for a term not exceeding two years, with hard labor. The legal offense comes generally under the head of burglary or house-breaking. A less punishment applies to the offense when committed in dissenting chapels.—In Scotland there is no increase of severity in the punishment by reason of the sacred character of the things stolen.

SACRISTAN (Lat. *sacra*, sacred things), an official attached to a church, who is charged, under the priest or ruler of the church, with the care of the church, and of all its appurtenances. It is his duty to open and close the church, to take care of the sacred vestments and utensils, and to prepare what may be required for public service. In some Roman Catholic churches the sacristan is a clerk in minor orders. The English name sexton is derived from this word.

SACRISTY, an apartment attached to a church, in which are kept the sacred objects used in the public worship, and in which the clergy and other functionaries who take part in the service assemble and prepare for the ceremonies on which they are about to enter. In many foreign churches the sacristy is a spacious and costly building.

SACROBOSCO, JOANNES DE (Anglicè, *John of Holywood*), was an English mathematician of the 13th c., entered the university of Paris in 1221, and afterwards became professor there. He died at Paris in 1256. Sacrobosco was one of the first doctors of the middle ages who made use of the astronomical writings of the Arabians. His treatise, *De Sphæra Mundi*, is merely a paraphrase of a portion of Ptolemy's *Almagest*. No book enjoyed greater renown as a manual among the scholastics. First published in 1472, it passed through more than 20 editions—some even say 65—with as many commentaries. Other works of Sacrobosco are *De Computo Ecclesiastico* and *De Algorithmo*, one of the first works on arithmetic in which the numerical notation of the Arabs is employed.

SACRUM, or OS SACRUM, is a triangular bone situated at the lower part of the vertebral column (of which it is a natural continuation), and wedged between the two innominate bones so as to form the keystone to the pelvic arch. It is readily seen to consist of five vertebræ with their bodies and processes, all consolidated into a single bone. Its anterior surface is concave, not only from above downwards, but also from side to side. The posterior surface is convex, and presents, in the middle vertical line, a crest, formed by the fusion of the spines of the vertebræ, of which the bone is composed. The last sacral vertebra has, however, no spine, and the termination of the vertebral canal is here very slightly protected.

Various reasons have been assigned for the peculiar name given from very olden times to this bone. One of the reasons assigned is that it was the part used in sacrifices. Another reason is based on the view maintained by the Jewish rabbins, who held that this part of the skeleton, which they called "luz," resisted decay, and became the germ from which the body would be raised:

> "From whence the learned sons of art
> *Os sacrum* justly call the part."
> Butler's *Hudibras*, cant. ii., part iii.

SACS AND FOXES, two tribes of Algonquin Indians living originally around Detroit. The Sacs were driven by the Iroquois to Green bay, where they joined the Foxes. The Sacs sided with the English in the revolutionary war and the war of 1812. They joined Pontiac, while the Foxes remained friendly to the whites. The Sacs and Foxes in 1804 ceded to the United States territory on the Illinois, Fox, Missouri, and Wisconsin rivers. The majority of the tribe was then n. of the Mississippi. A portion of the kindred tribes participated in the Black Hawk war, after which they made further cessions of land. Soon after this they were living around the Des Moines river. They were removed by the treaty of 1842. They have steadily decreased in numbers, and efforts to civilize them have been unsuccessful. A small remnant, probably not more than 80, occupy a reservation in n.e. Kansas and s.e. Nebraska. The remainder, numbering about 450, are near the Red fork of the Arkansas, except a few who settled in Iowa in 1857.

SACY, ANTOINE ISAAC, Baron SILVESTRE DE, one of the most celebrated orientalists, was born at Paris in 1758. After being grounded in the classics, he commenced at the age of 12 the study of Hebrew, to which, as he advanced in years, he added the other branches of Semitic—Syriac, Aramaic, Samaritan, and finally Arabic. Persian and Turkish he acquired still later; but though one of the greatest masters of Arabic and Persian that ever lived, he never made much progress in Turkish. Modern European languages and jurisprudence formed collateral branches of his stupendous acquisitions. From 1781 he held various appointments under government, chiefly in the mint. His first appearance in the world of letters dates from 1780, when he commenced to contribute to Eichhorn's celebrated *Repertorium*. In 1785 he was elected a member of the French academy; and a number of monographs by him followed each other in quick succession in the transactions of this body, chiefly on Arabic and Persian history, literature, and antiquities. In 1793 he published his first great work the *Annales de Mirkhond*, translated, with an extensive commentary, from the Persian. In 1792 he retired from the service of the government, to devote himself exclusively to his favorite studies; in 1795 he was appointed to a chair in the newly-founded ecole des langues orientales; but refusing to take the oath of hatred against royalty, he was not allowed to teach. In 1803, when the institute was completely reorganized, he took his seat there again; and shortly after was nominated professor of Persian at the collége de France. In 1808 he became a member of the corps législatif, and was subsequently attached to the commission and council of public instruction. In 1822 he was made administrator of the collége de France and the ecole spéciale des langues orientales; and in the same year he founded, with Abel Rémusat, the société Asiatique. Under the new Orleans government, to which he soon attached himself, he was nominated inspector of the oriental type of the oriental printing-office, and perpetual secretary of the académie des inscriptions. Yet, with these numerous offices on his shoulders, to all of which he attended most conscientiously, he never for one instant relaxed in his studies; and the number of his essays, memoirs, pamphlets, papers, etc., besides his larger works, is perfectly prodigious. He died, full of years and honors, in 1838, and was buried in the Père Lachaise. The academy had a medal struck in his honor, and his bust was placed in the library of the institute. Oriental studies owe to him more, almost, than to any other orientalist of our age. Irrespective of his own brilliant and numerous labors, he furthered and promoted his favorite science in every possible way—founding, or causing to be founded, oriental chairs in France, and forming such disciples as Freitag, Kosegarten, Rasmussen, Chézy, Quatremère, Jaubert, Saint-Martin, and others of more or less eminence as orientalists.

Among his works we would chiefly enumerate his *Grammaire Arabe*, the most classical work of its kind, and which has given Arabic studies an entirely new impulse, forming, as it were, the turning-point between the ancient and modern oriental philology. Next to this stands his *Chrestomathie Arabe*, with the *Anthologie Grammaticale Arabe*. Among his other writings are *Mémoires sur Diverses Antiquités de la Perse;* the translation of Abdollatis's *Egypt*, with notes; his editions of *Calila ve-Dimnah;* of the *Pendnâmeh*, with a French translation; the *Makamat* of Hariri; his *Mémoires sur l'Etat'Actuel des Samaritains; Exposé de la Religion des Druses;* and his manifold contributions (above 400 in number) to the *Magasin Encyclopédique, Mémoires de l'Institut, Recueil de l'Académie des Inscriptions, Fundgruben des Orients, Annales des Voyages, Journal de la Société Asiatique, Biographie Universelle*, and Eichhorn's *Repertorium für biblische und orientalische Literatur, Revue des Deux Mondes*, etc.

SACY, SAMUEL USTAZADE SILVESTRE DE, son of the foregoing, a journalist, was b. in 1801. In 1828 he became attached to the staff of the *Journal des Débats*, and has ever since remained faithful to its columns. His has been chiefly the polemical part; and it is supposed that, not omitting to take part in almost every public question, he wrote about two-thirds of the political articles that appeared in that paper during the second quarter of the present century. From 1852, when the empire was re-established, he relinquished politics, and became the principal reviewer of the paper. In 1848 he was appointed administrator of the Mazarin library; in 1854 was elected a member of the academy; in 1864 he became a member of the council of education; in 1867 of the senate. In 1858 he published a collection of his literary articles (*Variétés Littéraires, Morales, et Historiques*, 2 vols.). In conjunction with Ed. Thierry and others, he edited *Rapport sur l'état des Lettres et des Sciences* (1868). He also edited a number of religious works, and in 1861–64 an edition of the Letters of Madame de Sévigné in 11 volumes. He died Feb., 1879.

SADDENING, a peculiar method of applying certain mordants in dyeing and printing cloths, so as to give duller shades to the colors employed than those they ordinarily produce.

SADDLEBACK, a well-known mountain of Cumberland, 4½ m. n.e. of Keswick, 2,787 ft. high.

SADDLERY. Saddlery is next in importance to human clothing, being essential to the employment of horses, therefore its manufacture is carried on in almost every town and village. England, however, exports large quantities of saddlery, nearly all of which is made at Walsall, in Staffordshire, or in the neighborhood. The value of the exports of saddlery and harness amounts to nearly £400,000 per annum. A saddle consists of the wooden frame or *saddle-tree*, the *skirts* or padded *under-flaps*, the *upper-flaps* and *seat*, which are generally made of tanned pigskin, the *girth* or *belly-band*, the *stirrup-straps*, the *stirrups*, and the *crupper-loop*.

SAD'DUCEES (*Zedukim*), a Jewish school or party—not a "sect," as they have been generally denominated since Josephus—of the times subsequently to the Syrian wars, and often mentioned in the New Testament, the Talmud, and the Midrash. Their origin, as well as their name, has given rise to many speculations and suggestions, but none can be considered satisfactory. Modern investigators have derived the name from Zadikk, righteous man, a denomination which the Sadducees are supposed to have assumed in contradistinction from the Pharisees, the Separatists, as designating their own rejection of all superfluous and exaggerated religious practices, and their stand upon the words of the law itself.

The tenets of the Sadducees are noticed as contrasted with those of the Pharisees (q.v.).

A misconceived notion of some church fathers, to the effect that the Sadducees rejected all the canonical books of the Old Testament, with the sole exception of the Pentateuch, hardly requires refutation. They held the whole of the Old Testament as sacred as the Pharisees, and they quote equally from all its portions in support of their views. They would, if this or any other of those exaggerated accounts of their "unbelief" had any foundation, not have remained in the Sanhedrim, their members would not have been high-priests, and the Pharisees would not have fought against them about mere trifles and casuistically. But, on the other hand, their sober rationalism could not, apart from their aristocratic tendencies, at a time in which the immense struggle for liberty was still fresh in the people's minds, gain for them that popular sympathy which the Pharisees—eager, jealous, patriotic, pious, learned men of the people, enthusiastic men of progress—so easily acquired and held. Thus Sadduceeism, of which we hear so much in the New Testament, and which was combated as "the leaven of Herod" by Christ, while he only inveighs, as does the Talmud, against the hypocrites among the Pharisees, died out soon after the 1st c. A.D. The term under which they are once mentioned in the Mishna, viz., Karaim, became, at a later period, the name of a Jewish sect, still in existence, who reject all tradition, simply holding by the written law as their sole guide. See article Jewish Sects. The Talmud speaks of certain writings of the Sadducees, but nothing has survived. A criminal code of theirs, of a somewhat arbitrary nature, is mentioned in *Mes. Tuan.* iv.

SÂDI, Sheikh Muslih Addin, one of the most celebrated Persian poets, was b. at Shiraz, about the year 1184. Little is known of the circumstances of his life. His father's name was Abdallah, and he was a descendant of Ali, Mohammed's son-in-law; notwithstanding his noble lineage, however, he held but an insignificant position. Sâdi was early left fatherless. He received his education in science and theology at Bagdad, and from here he undertook, together with his master, his first pilgrimage to Mecca; a pilgrimage which he subsequently repeated no less than 14 times. He traveled for a great number of years, and is said to have visited parts of Europe, Barbary, Abyssinia, Egypt, Syria, Palestine, Armenia, Asia Minor, Arabia, Persia, Tartary, Afghanistan, and India. Near Jerusalem, "where," he says, "I associated with the brutes," he was taken prisoner by the crusaders, not while fighting against them, but while practicing religious austerities in the desert. He was ransomed for ten dinars by a merchant of Aleppo, who recognized him, and gave him his daughter in marriage: this union, however, did not prove happy. He married a second time, and lost his only son from that marriage. The latter part of his life Sâdi spent in retirement near his native town, and he died, at a very old age, in 690 H., or 1263 A.D.; according to others, however, he did not die until 1291 or 1292 A.D. In person he is described as having been of rather insignificant appearance, short, slim, and spare, nor is there much to be said for his personal prowess. His was a contemplative, pious, and, so to say, philosophical disposition. The years of his retirement from life he occupied in composing those numerous works which have made him justly famous through east and west. Although European critics would hardly be inclined to indorse to the full the judgment passed upon him by his countrymen, that he was "the most eloquent of writers, the wittiest author of either modern or ancient times, and one of the four monarchs of eloquence and style," yet there is no doubt that this "nightingale of thousand songs" is deservedly held among the foremost masters of poetry, and that he fully merited the honors showered upon him by princes and nobles, both during his lifetime and after his death. A magnificent mausoleum, with a mosque and college attached to it, was erected in his honor at the gates of Shiraz, and the people, who soon wound a halo of legend around his life, flocked thither in pilgrimage; and so carefully is his tomb guarded, that when visited by col. Franklin in 1787, it was in the same state as when Sâdi was buried.

The catalogue of his works comprises 22 different kinds of writings in prose and verse, in Arabic and in Persian, of which *ghazels* and *kassidas* (odes, dirges) form the predominant part. The most celebrated and finished of his works, however, is the *Gulistan*, or rose-garden, a kind of moral work in prose and verse, consisting of eight chapters, on kings, dervishes, contentment, taciturnity, love and youth, decrepitude and old age, education, and the duties of society, the whole intermixed with a number of stories, maxims, philosophical sentences, puns, and the like. Next to this stands the *Bostan*, or tree-garden, a work somewhat similar to the *Gulistan*, but in verse, and of a more religious nature. Third in rank stands the *Pend-Nameh*, or book of instructions. Elegance and simplicity of style and diction form the chief charm of Sâdi's writings. In wit he is not inferior to Horace, with whose writings he, according to one source, may not have been unacquainted, since he is said to have known Latin. The first complete edition of his works, called the *Salt-cellar of Poets*, by Harrington, was published in Calcutta, 1791–95, and has been reprinted since by native presses in India. The *Gulistan*, first edited with a Latin translation by Gentius (Amsterdam, 1651), has been reprinted very frequently, and has been translated into a number of European tongues, into English chiefly by Gladwin, Ross, and Eastwik. The *Bostan* was first published complete in Calcutta, 1828 (Vienna, 1858), and has likewise been translated into other languages.

SADLER, Sir Ralph, 1507–87; b. England; employed by Henry VIII. in the dissolution of the monasteries, and afterward on diplomatic missions to Scotland. He was knighted for his gallantry at the battle of Pinkie, 1547, and named by the king's will one of 12 councilors to the commission of 16 nobles to whom the government was given. Elizabeth called him to the privy council, and made him jailer of Mary queen of Scots at Tutbury castle.

SADO, a Japanese island, w. of Japan; 40 m. long, with an average breadth of 8 m.; pop. about 125,000. The surface is rugged. The soil is poor. The chief occupation is mining. Gold, silver, copper, and lead are found throughout the island, though not in rich masses.

SADOLE'TO, JACOPO, 1477–1547; b. Italy; ordained to the priesthood, appointed secretary to Leo X., and afterward bishop of Carpentras. Made cardinal, he opposed Calvinism, but with moderation, and interceded with Francis I. for the Waldenses. He published several books on religious subjects.

SADOW'A, a village of n. Bohemia, in Austria, 8 m. n.w. of Königgrätz. 58 m. n.e. of Prague; pop. 105. It is on the Bistritz river, and was the scene of what proved to be the decisive battle of the German-Italian war, sometimes called the battle of Koniggrätz. On June 16, 1866, the Prussians entered Saxony, and Bohemia on the 23d. June 28 the whole army had crossed the mountains, and the forces were united under king William I. On July 3d they met the Austrians under Benedek, 400,000 men being engaged; Prussians, 230,000 and 800 guns; Austrians, 185,000, including 30,000 Saxons, with 700 or 800 guns. At 7 A.M. the battle commenced, and continued unabated until 4 P.M., resulting in the complete rout of the Austrians, whose loss was 40,000 killed and wounded, 20,000 prisoners, and 174 guns. The Prussian loss was 10,000; the needle-gun was their efficient weapon.

SAFE-CONDUCT, a passport granted, on honor, to a foe, enabling him to pass where it would otherwise be impossible for him to go with impunity. Safe-conducts are granted in war for the purposes of conference, etc., and to violate the provisions of such a pass has always been esteemed a disgraceful breach of the laws of honor.

SAFED', a small t. of Palestine, in the pashalic of Acre, and in the ancient province of Galilee, stands on a mountain 2,500 ft. high, 12 m. n. of Tiberias. The inhabitants, about 5,000 in number, are engaged in the manufacture of cloth and in dyeing, and the country in the vicinity is largely productive of wine and oil. It is an ardent wish of the Jews to die at Safed, because they believe that the expected Messiah will make it his capital. The Jews possess about thirty synagogues in the town, also a college for instruction in Hebrew and the Talmud. Before 1837 Safed was a handsome town; but in that year it was partly destroyed by an earthquake, and more than 2,000 people were killed.

SAFES, FIRE-PROOF. The manufacture of iron safes for the preservation of money and valuable papers has become one of great importance. The foundation of the plan on which fire-proof safes are still constructed was laid by a Mr. Richard Scott in 1801. Mr. Thomas Milner in 1840 patented a fire-proof safe embodying the same principle, but with some improvements. In 1843 letters-patent were granted to Messrs. Tann for the use of a mixture of pounded alum and gypsum, previously heated and cooled, as a fire-resisting medium placed between two plates of iron, from 3 to 6 in. apart, which together form the wall of the safe. Milner's plan was to fill the jacket formed by the double-plated sides with sawdust, in which were packed a number of small tubes filled with an alkaline solution, and hermetically sealed, or crystals of alum or soda, containing from 40 to 60 per cent of water of crystallization. In case of fire, and the safe becoming heated, the tubes burst, or the crystals melt and saturate the sawdust with water, which becomes steam, and passes into the inner chamber of the safe, and thus protects the contents, if inflammable, from fire for a considerable length of time. Fire-proof safes are still made on the same principle. Messrs. Chubb use a mixture of alum and a mineral substance they procure from abroad. Many of the safes now made are rooms rather than boxes. A safe deposit company has recently been formed in England (the idea originating in the United States); and in 1875 there was completed in London a large building, in the highest degree proof against fire or thieves, containing about 10,000 safes, which are let out to the public.—See *Protection from Fire and Thieves*, by G. H. Chubb, 1875.

SAFETY-CAGE. See MINING.

SAFETY-FUSE, a species of fuse invented by Messrs. Bickford for use in the Cornish mines, and now generally employed in the chief mining districts, consists of a hollow cord of spun yarn or hemp, tarred on the outside to render it waterproof, and filled with tightly-rammed gunpowder. This fuse ignites steadily at the rate of about 2 ft. per minute, so that the time of the explosion can be easily regulated. The use of this contrivance has contributed to prevent those accidents arising from premature explosions, formerly of very common occurrence in mines. The fuse-tube is sometimes made of gutta-percha.

END OF VOL. XII.